

The Ophionine Wasps of Hawaii (Hymenoptera: Ichneumonidae)

DANIEL J. BENNETT

Division of Entomology, Natural History Museum, and Department of Ecology and Evolutionary Biology, 1501 Crestline Drive-Suite #140, PSB, University of Kansas, Lawrence, Kansas 66049-2811, USA

Abstract.—Hawaii's largest group of Ichneumonidae, the Ophioninae, is reviewed. Thirty species are recognized in one genus, *Enicospilus* Stephens. A key to species and a table of distributions indicating 26 new island records are provided. The following seven species are described as new: *Enicospilus ashei*, *Enicospilus dorsolineatus*, *Enicospilus elekino*, *Enicospilus hainesi*, *Enicospilus gladiator*, *Enicospilus minimus*, and *Enicospilus petilus*. *Enicospilus tyrannus* Perkins 1910 is newly synonymized with *Enicospilus longicornis* Ashmead 1901. The following genera are synonymized with *Enicospilus*: *Abanchogastra* Perkins 1902, *Banchogastra* Ashmead 1900, and *Pycnophion* Ashmead 1900. Replacement names are *Enicospilus blackburni* (= *Enicospilus molokaiensis* Ashmead 1901) and *Enicospilus swezeyi* (= *Pycnophion fuscipennis* Perkins 1910).

"The variability of many of the Hawaiian Ophionini is so excessive, that if similar variation occurs in other tropical countries, the group may well prove one of the most difficult of entomological studies."

— R. C. L. Perkins 1915

Perkins' prescience indeed foretold a challenge to systematic entomologists. Yet, at the time he couldn't have fully known the magnitude of the problem. The ophionine genus *Enicospilus* alone is now represented by an excess of 650 described species (Yu and Horstmann 1997), with an untold diversity concentrated in tropical areas and particularly large radiations occurring in Madagascar and New Guinea (Gauld and Mitchell 1981). Likewise, in the most remote of tropical areas, the Hawaiian Islands, *Enicospilus* has flourished and given rise to an array of species that comprise the majority of Hawaii's native ichneumonids. Many of these are notable for morphologies and habits that differ strikingly from an otherwise homogeneous *Enicospilus* outside the islands (Gauld 1985, Bennett 2004). Such features include a variety of ovipositor lengths and shapes,

drastic reductions in body size, stout body forms, and, concomitant with diurnal behavior, smaller eyes and dark coloration (e.g. Figs 1, 4E). Woefully little is known about the biology of most Hawaiian *Enicospilus* species, yet from the variety of ovipositor types exhibited, and from one host record, it is evident that the evolution of this morphological exuberance is at least in part related to the attack of novel hosts. As koinobiont endoparasitoids, ophionine species are generally known to parasitize large, exposed caterpillars, particularly of the families Noctuidae, Lasiocampidae, Lymantriidae, Saturniidae, Geometridae, Arctiidae, and Sphingidae (Gauld 1988). The habits of several Hawaiian species are indeed consistent with this. Swezey (1931, 1954), however, reared *Enicospilus swezeyi* (Fig. 1), a species with a long, straight ovipositor from the cosmopterigid *Hypomocoma chilonella* Walsingham concealed within *Rubus* stems. There are as of yet no host data for additional species with long, straight ovipositors or for those with long, curved ovipositors.

As is the case for many Hawaiian insects, the first ophionine wasps were collected in



Fig. 1. *Enicospilus swezeyi*.

Hawaii by the minister naturalist Thomas Blackburn. During the years 1877–1883, he sent many insects to specialists in London including four ophionine wasps to Cameron who described them as male-female pairs of two species in the genus *Ophion* (Cameron 1883), though the original series actually contained four distinct species (Perkins 1915). These were appropriately transferred to *Enicospilus* (or the unjustified form *Henicospilus*) in subsequent catalogs (Szépligeti 1905, Morley 1912). Meanwhile, Ashmead was describing new species and genera of Hawaiian Ophioninae (Ashmead 1900, 1901) sent to him by Perkins who later complained bitterly about Ashmead's

"extraordinary" treatment of conspecific individuals, his mixtures of species under single names, and his habit of designating as types, individuals from locations other than those for which such species were named (the latter can be explained given that Ashmead didn't designate holotypes per se, but rather often wrote "type" on each individual of his syntype set, which in some cases represented multiple islands). Perkins' revision (1915) recognized six genera of Hawaiian Ophioninae and fully treated the species of *Enicospilus*, providing a key and noting many important characters. Cushman (1944) attempted to use subgenera for a number of taxa (including

two of Perkins' genera) as a means of recognizing the increasing number of aberrant derivatives of *Enicospilus* in Hawaii. His use of subgenus was not followed, but his key works well, and his review was important in showing that a good number of names were confused for widespread, polymorphic species. Since Cushman's work, species-level taxa have generally remained stable, but the generic classification of these species has fluctuated between the opinions of several authors. Townes (1945) further reduced the number of genera by synonymizing *Abanchogastra* and *Banchogastra* under *Enicospilus*. Cushman (1947) recognized *Pycnophion* and *Banchogastra* as genera, but not *Abanchogastra*. Townes et al. (1961) took the same position as Townes (1945), but later Townes (1971) also raised *Banchogastra* to genus. That such confusion would reign regarding the genus-group status of these taxa is a result of the evolution of highly apomorphic morphologies and the subjectivity inherent in deciding which derivatives are sufficiently different to warrant removal from *Enicospilus*. The phylogenetic analysis of Gauld (1985) provided the first congruence test to indicate that *Pycnophion*, *Banchogastra*, and *Abanchogastra* were indeed apomorphic, insular lineages derived from within *Enicospilus*. Recent and forthcoming cladistic analyses have upheld this view (Bennett 2004, in prep.). Gauld (1985), however, maintained the genus-rank status of these groups owing to his view that it was impractical to include highly aberrant derivatives within an otherwise morphologically and behaviorally homogeneous *Enicospilus*; this arrangement was upheld in a recent catalogue of Ichneumonidae (Yu and Horstmann 1997). Herein is proposed a classification that, for the first time, reflects the *Enicospilus* ancestry of all Hawaiian Ophioninae. Descriptions of new taxa, a summary of species and their distributions (Table 1), and an updated key to species are also provided.

METHODS

Morphological terminology, indices, and species description format generally follow Gauld and Mitchell (1981) and Gauld (1988); select additional terms are described by Townes (1969). Integumental sculpture terminology follows Harris (1979). Mandibles are described in reference to a horizontal position as opposed to projecting ventrally. Malar space is measured as the shortest distance between a point just above the anterior dorsal margin of the mandible and the eye. Fore wing length does not include the tegula. The cubital index (CI) of the hind wing is newly defined as the distance between the junction of Cu1 (second abscissa) and cu-a and the junction of cu-a and 1A along an imaginary line between the junction of M+Cu and Cu1 (first abscissa) and the junction of cu-a and 1A (Fig. 5D-b) divided by the latter imaginary line (Fig. 5D-a). The ventral face of the mesopleuron is described as the "mesosternum." The "lower metapleuron" is used to mean that part of the metapleuron ventral and posterior to the propodeal spiracle. The angle of the anterior mesoscutum and the posterior declivity of the scutellum are estimated with reference to a horizontal line taken as a line between the cervix and the posterior foramen of the propodeum. Hind coxa length is measured from the basal constriction to the dorsal apical-most point in lateral view. Tergal numbers are in reference to the metasoma and not the true abdomen. The length of T2 is measured in lateral view between anterior and posterior dorsal midpoints.

Many of the characters previously pointed out as critical to the delineation of ophionine species (Gauld and Mitchell 1981, Gauld 1988) are likewise important in Hawaiian *Enicospilus*. Paramount among these is the form of the hairless region of the discosubmarginal cell, or fenestra, and the sclerites often accompanying it. On this basis alone, many species can be identified. Also important are the mandible shape,

Table 1. Distributions of Hawaiian Ophioninae. New island records indicated by *. Lower case “x” denotes unverified literature records.

Species	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii
<i>Enicospilus ashei</i> Bennett	X*					
<i>Enicospilus bellator</i> Perkins 1915		x	x		X	X
<i>Enicospilus blackburni</i> Bennett	X	X	X	x	X	X
<i>Enicospilus castaneus</i> Ashmead 1901		X	X	X	X*	X
<i>Enicospilus debilis</i> (Perkins 1902)		X			X	X
<i>Enicospilus dispilus</i> Perkins 1902	X	X	X	X*	X	X
<i>Enicospilus dorsolineatus</i> Bennett						X*
<i>Enicospilus elekino</i> Bennett					X*	
<i>Enicospilus ferrugineus</i> (Perkins 1915)		X*			X	
<i>Enicospilus fullawayi</i> Cushman 1944	X	X*			X*	X*
<i>Enicospilus gladiator</i> Bennett	X*					
<i>Enicospilus hainesi</i> Bennett		X*				
<i>Enicospilus hawaiiensis</i> (Ashmead 1900)						X
<i>Enicospilus kaalae</i> Ashmead 1901	X	X	X		X	X
<i>Enicospilus kauaiensis</i> (Ashmead 1901)	X		X*			
<i>Enicospilus lineatus</i> (Cameron 1883)	X	X	X	x	X	X
<i>Enicospilus longicornis</i> Ashmead 1901	X	X	X*		X	X
<i>Enicospilus melanochromus</i> Perkins 1915	X*	X	X*		x	X*
<i>Enicospilus minimus</i> Bennett		X*				X*
<i>Enicospilus molokaiensis</i> (Ashmead 1900)	X		X		X	
<i>Enicospilus niger</i> (Ashmead 1900)						X
<i>Enicospilus nigrolineatus</i> Ashmead 1901	X	X	X	X	X	X
<i>Enicospilus orbitalis</i> (Ashmead 1901)	X	X	X		X	X
<i>Enicospilus perkinsi</i> Cushman 1944	X					
<i>Enicospilus petilus</i> Bennett			X*		X*	X*
<i>Enicospilus pseudonymus</i> Perkins 1915	X*				X	
<i>Enicospilus swezeyi</i> Bennett	X	X*			X	
<i>Enicospilus variegatus</i> Ashmead 1901						X
<i>Enicospilus vitreipennis</i> (Perkins 1910)	X*	X*			X	X*
<i>Enicospilus waimeae</i> Ashmead 1901	X					x
Total 30	18	17	13	5	19	20

upper tooth shape, malar space, size and shape of the compound eye and ocelli, shape and sculpture of the scutellum, hind wing venation, pretarsal claws, propodeal sculpture, metasoma shape, ovipositor shape, and color. The posterior propodeal carina is not known to occur in any Hawaiian *Enicospilus*; its absence is not repeated in the descriptions.

Institutions and their acronyms are as follows: American Entomological Institute, Gainesville, FL, USA (AEIC); Bernice Pauahi Bishop Museum, Honolulu, HI, USA (BPBM); Canadian National Collection, Ottawa, Ontario, Canada (CNCI); The Natural History Museum, London, UK (BMNH); The United States National Museum (USNM); University of Hawaii, Manoa, HI, USA (UHM).

KEY TO SPECIES OF HAWAIIAN OPHIONINAE

1.
- Hind wing with first abscissa of Rs < 2.0× as long as rs-m (Fig. 7E), 1A absent and second abscissa of Cu1 present only as a short stub; very small, fore wing length about 5 mm or less *E. minimus*

-	Hind wing with first abscissa of Rs > 2.0× as long as rs-m, both 1A and second abscissa of Cu1 distinct (Fig. 5D); larger, fore wing at least 6 mm, usually much larger	2
2.	Fore wing discosubmarginal cell with or without sclerites, with distinct fenestra present; posterior transverse carina of mesosternum present medially	3
-	Fore wing discosubmarginal cell without sclerites, fenestra absent (Figs 23, 29), or if present, then only as a poorly defined region of reduced pubescence without distinct lower margin (Figs 17, 22, 27); posterior transverse carina of mesosternum absent medially, or if present then weak	22
3.	Fore wing with 1m-cu usually evenly curved or arched, if angulate and swollen medially, then only slightly so (Figs 10, 21, 26); ovipositor short and straight or curved, about 1.2× length of T2 or less	4
-	Fore wing with 1m-cu medially strongly angulate, swollen (Fig. 6), or with short stub (Figs 5C, 15); ovipositor long and straight, about 1.8× length of T2 or more	29
4.	Metasoma extremely slender, dorsomedial length of exposed portion of T5 in female, T4 in male, greater than lateral depth	5
-	Metasoma not as slender, dorsomedial length of exposed portion of T5 in female, T4 in male, less than lateral depth	8
5.	Fore wing discosubmarginal cell with 2 sclerites, proximal one very large (Fig. 8D)	<i>E. petilus</i>
-	Fore wing discosubmarginal cell without sclerites, or if one present, then not approaching in size that of above	6
6.	Fore wing discosubmarginal cell with fenestra broad, posterior margin extending beyond midpoint between Rs+2r and 1m-cu, with a single, linear sclerite at proximal, ventral margin of fenestra (Fig. 14)	<i>E. fullawayi</i>
-	Fore wing discosubmarginal cell with fenestra round and smaller, ventral margin not extending beyond midpoint between Rs+2r and 1m-cu, if sclerite present, then spherical	7
7.	Fore wing discosubmarginal cell without a sclerite (Fig. 25)	<i>E. orbitalis</i>
-	Fore wing discosubmarginal cell with a single sclerite (Fig. 26)	<i>E. perkinsi</i>
8.	Mesosoma yellow or yellow and black	9
-	Mesosoma brown, red, orange, or black	12
9.	Mandible with a heavily setose, diagonal groove (Fig. 36); fore wing discosubmarginal cell with 2 or 3 sclerites, central sclerite oval or triangular and medially placed in fenestra (Fig. 20); ovipositor downcurved	<i>E. longicornis</i>
-	Mandible with at most a weakly to moderately setose, diagonal line (Fig. 37); fore wing discosubmarginal cell with 1 or 2 sclerites, if 2, then the second positioned along ventral margin of fenestra; ovipositor straight	10
10.	Fore wing discosubmarginal cell with 2 sclerites (the second may be translucent; showing weakly in figure) (Fig. 24); hind femur yellow or yellowish-brown throughout; propodeum in large part black; metasoma yellow or yellowish-brown except for lateral dark line	<i>E. nigrolineatus</i>
-	Fore wing discosubmarginal cell with 1 or 2 sclerites (Figs 3C, 28); hind femur as described above or with apex black; propodeum as above or yellow to yellowish brown throughout; metasoma yellow, yellowish-brown, or black, never with lateral dark line	11
11.	Malar space 0.4–0.5× basal mandibular width; metasoma mostly yellow or yellowish-brown, except for a dorsomedial dark line	<i>E. dorsolineatus</i>
-	Malar space 0.3–0.4× basal mandibular width; metasoma mostly black, not forming a dorsomedial line	<i>E. variegatus</i>
12.	Fore wing discosubmarginal cell with fenestra large, extending posteriorly 3/4 or more the distance between Rs+2r and 1m-cu, and apically to about midpoint of Rs+2r or further; with 1 small, oval or attenuated sclerite, positioned at proximal posterior	

- margin of fenestra, nearer 1m-cu than Rs+2r (Figs 10, 16, 21); female S7 enlarged (Fig. 32); ovipositor straight 13
- Fore wing discosubmarginal cell with fenestra smaller, posterior margin extending about $2/3-1/2$ or less the distance between Rs+2r and 1m-cu, apically to about midpoint of Rs+2r or less; if alar sclerite(s) present, then variously shaped and positioned; female S7 not enlarged (Fig. 31), or if enlarged, then ovipositor downcurved (Fig. 33) 15
13. Fore wing with 1m-cu not thickened or angled medially (Fig. 16), alar sclerite spherical, not attenuated apically; middle segments of metasoma deep reddish or orangish-brown, usually strongly contrasted with much darker petiole and apical segments *E. kaalae*
- Fore wing with 1m-cu usually at least slightly thickened and/or angled medially (Figs 10, 21), alar sclerite often attenuated apically; middle segments variable in color but usually not strongly contrasted with petiole and apical segments 14
14. Fore wing with 1m-cu usually slightly angled medially; fenestra not or poorly defined proximal of sclerite (Fig. 10); aedeagus slender apically; light reddish-brown to orange in color *E. blackburni*
- Fore wing with 1m-cu not angled medially; fenestra broad and well defined proximal of sclerite; aedeagus bulbous apically; usually dark in color *E. melanochromus*
15. Dorsal surface of scutellum more or less flat, rugulose and/or coarsely pitted, scutellar carinae strong, often produced above medial part of scutellum; malar space $0.3-0.7\times$ basal mandibular width; male apical tarsomere parallel-sided or swollen basally in dorsal view, strongly curved in lateral view 16
- Dorsal surface of scutellum convex and lightly punctate, scutellar carinae weak or moderate, not produced above medial part of scutellum; malar space $0.1-0.4\times$ basal mandibular width; apical tarsomere of male evenly broadened apically in dorsal view, straight to moderately curved in lateral view 18
16. Fore wing with fenestra very small, without a distinct sclerite but with a faint sclerotization or pigmentation at posterior margin (Fig. 9); ratio of head height to width in frontal view about 1.1 *E. bellator*
- Fore wing with fenestra at least slightly larger, with 1 or 2 sclerites, or rarely with none or a vestigial proximal sclerite; ratio of head height to width in frontal view = $0.9-1.1$ 17
17. Malar space long, $0.4-0.7\times$ basal mandibular width; flagellum of female short, length equal to or less than that of fore wing; fore wing fenestra usually with 1 sclerite (Fig. 11), occasionally with none or with a second vestigial, medially placed sclerite *E. castaneus*
- Malar space $0.3-0.5\times$ basal mandibular width; flagellum of female longer, length equal to or greater than that of fore wing; fore wing fenestra usually with 2 distinct sclerites (Fig. 13), occasionally the second, medially placed sclerite is weak, or a third sclerite at distal margin of fenestra is apparent *E. dispilus*
18. Fore wing discosubmarginal cell without an alar sclerite 19
- Fore wing discosubmarginal cell with at least 1 alar sclerite 20
19. Orange except apical segments of metasoma black; mandible slender, with upper tooth medially swollen and long, $1.4-1.6\times$ length of lower tooth (Fig. 2D) ... *E. ashei*
- Usually brown or reddish-brown, apex of metasoma at most slightly darker; mandible moderately stout, upper tooth not conspicuously swollen medially, $1.1-1.6\times$ length of lower tooth *E. lineatus*
20. Mandible with a heavily setose, diagonal groove (Fig. 36); fore wing discosubmarginal cell with a large triangular proximal sclerite, a distinct central sclerite, and often a third pale sclerite outlining distal ventral margin of fenestra (Fig. 20); ovipositor downcurved (Fig. 33). *E. longicornis*

- Mandible with at most a moderately setose, diagonal line (Fig. 37); fore wing discosubmarginal cell usually with a single variously sized sclerite, rarely with a second medial sclerite, never with a third apical sclerite; ovipositor straight 21
- 21. Fore wing discosubmarginal cell with a single, extremely large proximal sclerite (Fig. 30). *E. waimeae*
- Fore wing discosubmarginal cell with proximal sclerite smaller, at most as in Fig. 19, usually much smaller (Fig. 18) *E. lineatus*
- 22. Metasoma more or less black, rarely with a deep reddish tint; fore wing discosubmarginal cell without a sclerite 23
- Metasoma of typical brown, red, or orange coloration; fore wing discosubmarginal cell with or without a sclerite 28
- 23. Head entirely black; compound eye highly reduced (Figs 4A, B); propodeum evenly colliculate, without rugae; mid coxa with ridges dorsomedially *E. elekino*
- Head entirely black or with pale areas; if compound eye reduced, then propodeum coarsely rugose, areolate, or rugostriate; mid coxa at most slightly wrinkled dorsomedially 24
- 24. Ovipositor shorter than petiole; compound eye highly reduced (cf. Figs 4A, B); fore wing discosubmarginal cell usually densely setose throughout, usually with no trace of a fenestra (Figs 23, 29); propodeum coarsely rugose, areolate, or rugostriate, with strong anterior transverse carina 25
- Ovipositor about twice petiole length or more; compound eye not reduced; fore wing discosubmarginal cell markedly less setose, especially proximally, often with a vestigial fenestra or poorly defined area of reduced pubescence below Rs+2r (Figs 17, 22); propodeum evenly colliculate or moderately rugose, if the later, then anterior transverse carina absent 26
- 25. Petiole very compact, bulbous apically, ventral posterior midpoint positioned far anterior such that the ratio of ventral to dorsal length = about 0.4 or less (Fig. 34) (measured in lateral view from sub-basal narrowing); T2 wider than long in dorsal view; fore wing dark brown anteriorly, highly contrasted with lighter posterior apical area *E. niger*
- Petiole not as compact, flatter apically, ventral posterior margin usually positioned further posterior such that the ratio of ventral to dorsal length = about 0.5 (Fig. 35); T2 usually longer than wide in dorsal view; fore wing variously light or dark, anterior and posterior apical area usually of similar hue or only slightly contrasted *E. vitreipennis*
- 26. Ovipositor straight; anterior transverse carina of propodeum absent; setae of dorsomedial propodeum posteriorly directed; propodeum moderately rugose, at least posteriorly; mesosoma usually mostly red *E. swezeyi*
- Ovipositor upcurved; anterior transverse carina of propodeum present or absent; setae of dorsomedial propodeum erect or curved anteriorly; propodeum evenly colliculate throughout; mesosoma usually mostly black 27
- 27. Head and mesosoma all black *E. kauaiensis*
- Head and/or mesosoma with pale or red areas *E. molokaiensis*
- 28. Mandible with teeth stout, upper tooth shorter than lower tooth; posterior mesonotum and scutellum with lateral, longitudinal depressions; relatively large, fore wing length at least 11.5 mm *E. pseudonymus*
- Mandible with teeth slender, upper tooth longer or about equal in length to lower tooth; posterior mesonotum and scutellum evenly flat or convex; small, fore wing length about 9.0 mm or less *E. debilis*
- 29. Fore wing discosubmarginal cell without a sclerite (Figs 6, 15) 30
- Fore wing discosubmarginal cell with a distinct, medially placed sclerite (Fig. 5C). *E. gladiator*

- | | | |
|-----|--|-----------------------|
| 30. | Fore wing 1m-cu medially without a distinct stub (Fig. 6E) | <i>E. hainesi</i> |
| - | Fore wing 1m-cu medially with a distinct stub (Fig. 15) | 31 |
| 31. | Dark brown in color; Hawaii Island | <i>E. hawaiiensis</i> |
| - | Red or orange in color; Oahu, Maui | <i>E. ferrugineus</i> |
-

SYSTEMATICS

Enicospilus ashei, new species

Fig. 2A–F

Diagnosis.—This species can be recognized by the combination of a slender mandible and a long, medially swollen upper tooth (Fig. 2D), distinct fenestra lacking sclerites (Fig. 2F), and general orange to brownish-orange coloration, becoming black on apical metasomal segments.

Description.—Length of fore wing 9.5–13.1 mm in female, 11.0–12.8 mm in male. **Head:** Mandible slender, slightly twisted, medially and apically more or less parallel-sided; basal ventral margin moderately to strongly narrowed; outer surface with distinct basal concavity, setae scattered or fairly concentrated medially, very lightly punctate and generally smooth; upper tooth long, swollen medially, 1.4–1.6× as long as lower tooth, about equal in width to lower tooth at base (Fig. 2D). Labrum 0.2–0.3× as long as broad, apical margin broadly rounded to broadly pointed. Malar space 0.1–0.2× as long as basal mandibular width. Clypeus in profile weakly to moderately convex, proximal margin weakly to moderately distinct from lower face; in frontal view 1.6–2.0× as broad as long, sparsely and lightly punctate, apical margin medially flat or broadly rounded. Lower face 0.6–0.7× as broad as long, lightly to moderately punctate, evenly so or somewhat more coarse or dense medially. Compound eye large and strongly convex, head width in frontal view 1.1–1.3× length (Fig. 2A). Gena with setae short, inconspicuous and declined forward; in dorsal view somewhat narrow and constricted to moderately rounded behind compound eye (Fig. 2B); GOI = 2.4–3.4. Ocelli moderately large,

lateral ocellus removed from compound eye by 0.1× its diameter; FI = 0.5–0.7. Occipital carina dorsally flat or broadly rounded, ventrally joining or ending short of hypostomal carina. Flagellum in female 1.2–1.3× length of fore wing, with 48–51 segments, mid segment 1.9–2.3× as long as broad; in male 1.3–1.5× length of fore wing, with 55–57 segments, mid segment 1.7–2.1× as long as broad. **Mesosoma:** Mesoscutum in profile rounded anteriorly, angled by 70°–90°; notauli weak or not apparent. Scutellum in dorsal view 1.1–1.3× as long as anteriorly broad, upper surface moderately flat to moderately convex, lightly punctate; with lateral carinae moderately convergent, extending 3/5–4/5 scutellar length; with posterior declivity angled by 30°–45° in profile. Mesopleuron punctate to rugulostriate (some individuals less sculptured or evenly punctate medially); scrobe distinct, may or may not be set in shallow depression that, when present, may extend dorsally; speculum well defined as a dorsal posterior swelling; mesopleural sulcus with weak transverse ridges; epicnemial carina strong, complete medioventrally. Mesosternum without lateral longitudinal depression; with posterior transverse carina complete medioventrally. Lower metapleuron moderately convex, punctostriate to rugulostriate. Propodeum in profile weakly and evenly rounded throughout; pubescence with setae posteriorly declined, straight or with some posterior ones apically curved; spiracle narrowly oval; anterior furrow fairly shallow to moderately strong, rugulose to rugulostriate, anterior area 0.1–0.2× total propodeal length; anterior transverse carina absent, posterior transverse carina absent; spiracular area minutely colliculate; posterior area rugose. Separation between

propodeum and lower metapleuron indicated by weak furrow, slightly carinate anteriorly in some specimens examined. Fore wing (Fig. 2F) with pterostigma fairly abruptly to somewhat evenly narrowed distally; discosubmarginal cell without sclerites (vestiges apparent in some individuals), fenestra moderately long and moderately wide, extending apically to about $1/3$ the length of $Rs+2r$ and posteriorly to nearer $1m-cu$ than $Rs+2r$; $Rs+2r$ thickened in basal half, slightly to moderately sinuous, evenly tapered and slightly concave medially; $Rs+M$ slightly to strongly arched in basal half; $1m-cu$ strongly arched, slightly thickened medially in some specimens examined; $AI = 1.7-2.6$; $CI = 0.3-0.5$; $ICI = 0.3-0.5$; $SDI = 1.0-1.3$; $cu-a$ anterior of $Rs+M$ by $0-0.7$ length of $cu-a$; 1^{st} subdiscal cell sparsely pubescent distally and/or medially or nearly devoid of setae throughout. Hind wing with 5–7 distal hamuli in distal set; 1^{st} abscissa of Rs slightly concave or more or less straight basally, 2^{nd} abscissa more or less straight; 2^{nd} abscissa of $Cu1$ positioned midway or slightly ventral of midpoint between M and $1A$. Fore leg with tibia $9.4-10.3\times$ as long as wide, without an array of subapical spines. Mid leg with coxa smooth or slightly wrinkled medially, inner tibial spur $1.3-1.5\times$ as long as outer spur. Hind leg coxa in lateral view $1.8-1.9\times$ as long as deep, finely imbricate to colliculate and lightly punctate, slightly wrinkled dorsomedially in some specimens; trochantellus $0.4-0.8\times$ as dorsally long as broad; 4^{th} tarsomere in female $2.4-2.9\times$ as long as broad, $2.6-3.1\times$ in male; 5^{th} tarsomere of female $2.9-3.2\times$ as long as broad, evenly broadened distally in dorsal view, nearly straight to moderately curved in lateral view; 5^{th} tarsomere of male $3.6-4.2\times$ as long as broad, subparallel-sided to evenly broadened distally in dorsal view, moderately curved in lateral view; hind outer pretarsal claws of female and male dimorphic, approximately as figured (Figs 2C, E). **Metasoma:** Fairly slender, not apically deep in female; $T2$ $4.9-6.8\times$ as long as lateral height,

$3.8-6.8\times$ as long as dorsal width; thyridium narrowly oval to tear-shaped, midpoint positioned posterior of anterior margin of $T2$ by $0.3-0.4\times$ length of $T2$. Ovipositor short and straight or slightly upcurved, $0.7-0.8\times$ length of $T2$.

Color: Generally orange to brownish-orange; face pale laterally and behind compound eyes; wings slightly to distinctly infumate; legs fairly evenly orange, apical tarsomeres slightly to distinctly darker; metasomal segments 4–8 (and in some specimens portions of 3) darker; setae of head and propodeum pale.

Material examined.—**Holotype:** female, Hawaii, **Kauai**, Na Pali-Kona Forest Reserve, Pihea Trail, elevation 4200 ft, 15 June 1982 (K. and E. Sattler) (BMNH). **Paratypes** (17 all from **Kauai**): 4 males, 1 female, same data as holotype; 1 male same data as holotype except collected 21 August 1982; 1 female, Na Pali-Kona Forest Reserve, Milolii ridge, elevation 3000 ft, 26 June 1982 (K. and E. Sattler) (BMNH); 1 male, 1 female, Na Pali-Kona Forest Reserve, Alakai Swamp Trail, elevation 3800 ft, June 1982 (K. and E. Sattler) (BMNH); 1 male, Kokee State Park, Kumuwela Ridge, Waininiua Trail, elevation 3800 ft, 24 June 1982, (K. and E. Sattler) (BMNH); 1 female, Kokee State Park, Kaluapuhi Trail, elevation 4000 ft, 9 June 1982, (K. and E. Sattler) (BMNH); 1 male, Alakai Swamp, Kelekua Hut, elevation 4520 ft, 1982 (K. and E. Sattler) (BMNH); 2 females, Kokee Camp, elevation 3600 ft (1 female 1 April 1961, 1 female 30 March 1961) (D. F. Hardwick) (CNCI); 2 females, 1 male, Na Pali-Kona Forest Reserve, Alakai Swamp at junction of Pihea Trail, elevation 1200 m, 18 August 2006, UV light trap, (D. Rubinoff and J. Eiben) (Manoa).

Etymology.—The species name is given in honor of the late Dr. James S. Ashe for his critical, constructive, and enthusiastic advice and support given to me which much improved this work.

Enicospilus bellator Perkins

Fig. 9

Enicospilus bellator Perkins 1915: 528. Lectotype (designated by Townes et al. 1961: 270) female, Hawaii [Is.], Kilauea, VII.06, R.C.L. Perkins (BPBM) [examined]. Swezey and Brian 1927:

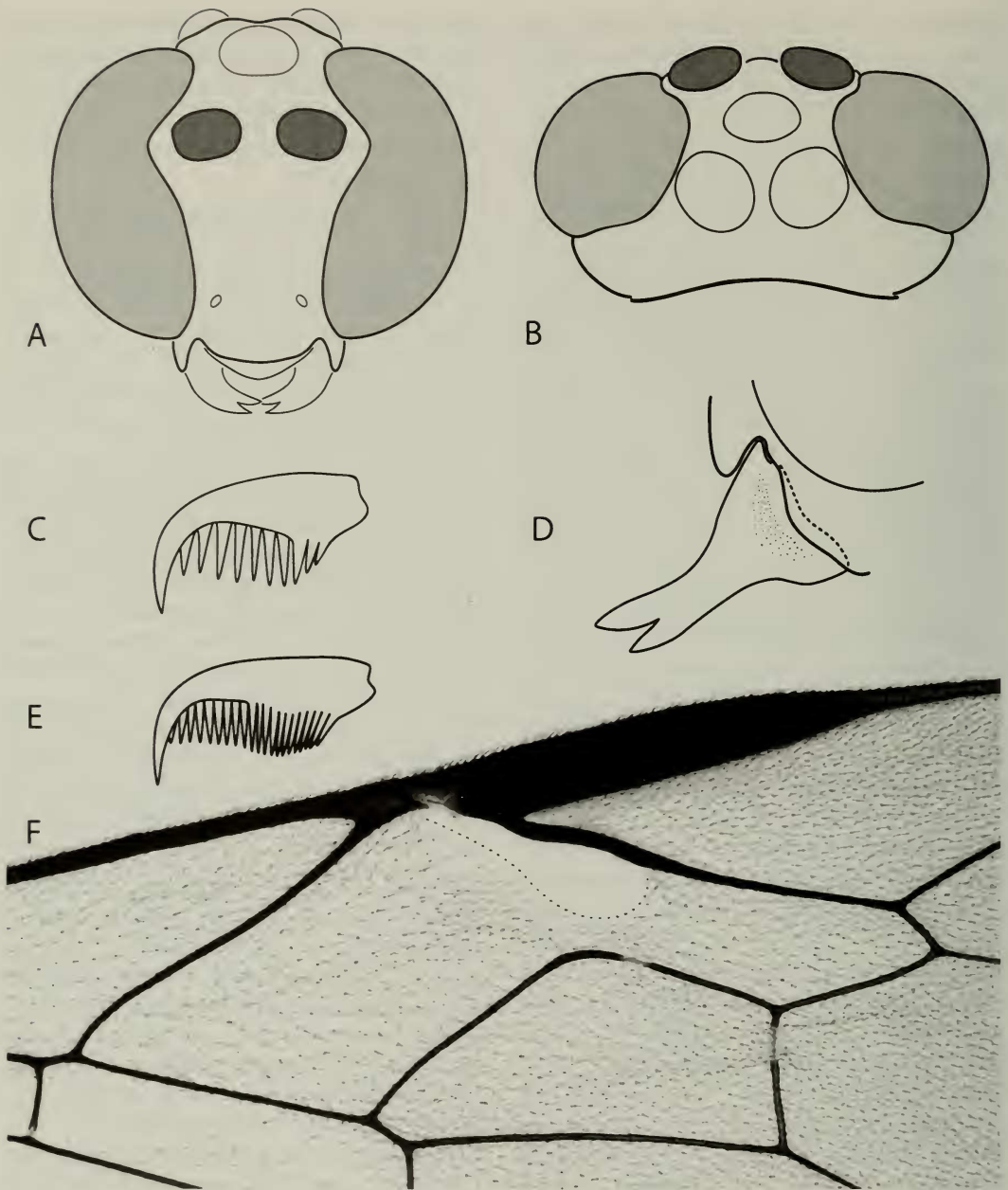


Fig. 2. *Enicospilus ashei*: A, frontal aspect of head; B, dorsal aspect of head; C, female hind outer claw; D, mandible; E, male hind outer claw; F, discosubmarginal cell of fore wing.

412. Townes et al. 1961: 270. Gupta 1987: 514. Yu and Horstmann 1997: 734.
Enicospilus (*Enicospilus*) *bellator* Perkins; Cushman 1944: 49.

Remarks.—This rarely collected species is similar to *E. castaneus* and *E. dispilus* in the

relatively flat and coarsely punctured dorsal part of the scutellum and the strongly curved, parallel-sided or basally swollen male pretarsal claw; it is distinguished from these species by the narrow fenestra lacking a distinct alar sclerite (Fig. 9). The few individuals I have seen have all been fairly

large (fore wing length 12.0–16.0 mm), red to reddish-brown, with the face and clypeus broadly yellow below the toruli outside the darker medial area; wings vary from hyaline to very slightly infumate.

***Enicospilus blackburni*, new name**

Fig. 10

Enicospilus molokaiensis Ashmead 1901: 349. Lectotype (designated by Townes et al. 1961: 282) female, Molokai, Mts, 4000 ft, 4.1893, Perkins (BMNH); preoccupied in *Enicospilus* by *E. molokaiensis* (Ashmead 1900) (transferred from *Pycnophion* to *Enicospilus* below). Perkins 1907a: 44. Perkins 1913: cx. Perkins 1915: 523. Fullaway and Giffard 1919: 51. Swezey and Bryan 1927: 412. Townes et al. 1961: 282. Gupta 1987: 555. Yu and Horstmann 1997: 745.

Henicospilus molokaiensis (Ashmead); Szépligeti 1905: 27.

Enicospilus (*Enicospilus*) *molokaiensis* Ashmead; Cushman 1944: 46.

Remarks.—This common species can be recognized by the combination of its coloration (reddish-brown to orange throughout, with usual exception of yellowish parts of the face, clypeus, and gena; wings vary from hyaline to very slightly infumate); fore wing with an angle in 1m-cu medially and very broad fenestra with a single, often attenuated, posteriorly positioned sclerite (Fig. 10); and the slender aedeagus. It is usually fairly small to medium-sized, with a fore wing length of about 9.5 mm; occasionally it is as small as 7.5 mm or as large as 12.6 mm.

Etymology.—The species epithet is dedicated to the minister naturalist Thomas Blackburn, the first European to collect Hawaiian ophionine wasps (as well as many other Hawaiian insects) and send them to specialists in London.

***Enicospilus castaneus* Ashmead**

Fig. 11

Ophion nigricans Cameron 1883: 193. Lectotype (designated by Perkins 1915: 521 [His usage of “type” is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art.

74.5).]) male, Sandwich, Hawaii [probably meaning Hawaii Island] (BMNH); preoccupied by *Ophion nigricans* Ruthe 1859, replaced with *O. nigriritulus* by Dalla Torre 1901. Blackburn and Cameron 1886: 180; 1887: 241. Ashmead 1901: 341. Alfken 1904: 573.

Enicospilus castaneus Ashmead 1901: 349. Lectotype (designated by Townes et al. 1961: 272 [Their usage of “type” is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Molokai, Mts, 3000 ft, 9 [?].1893, Perkins (BMNH); synonymized with *O. nigricans* (Cameron) by Perkins 1915: 534. Swezey and Williams 1932: 182. Townes et al. 1961: 271. Gauld and Mitchell 1981: 8. Gupta 1987: 521. Yu and Horstmann 1997: 736.

Ophion nigriritulus Dalla Torre 1901: 196; synonymized with *E. castaneus* Ashmead by Perkins 1915: 534. Szépligeti 1905: 31. Fullaway 1957: 271 [Misidentification of *Leptophion* sp. from Fiji (according to Gauld and Mitchell 1981)].

Henicospilus castaneus (Ashmead); Szépligeti 1905: 27.

Ophion nigriritulus Morley 1912: 64; preoccupied by *Ophion nigriritulus* Dalla Torre 1901.

Enicospilus (*Enicospilus*) *castaneus* Ashmead; Cushman 1944: 48.

Remarks.—This common, medium-sized to large species (fore wing length 8.0–16.0 mm) is similar to *E. bellator* and *E. dispilus* in the relatively flat and coarsely punctured dorsal part of the scutellum and the strongly curved, parallel-sided or basally swollen male pretarsal claw. It is distinguished from these species by the longer malar space (especially in the male), less convex compound eye, shorter antenna (especially in the female), and the single, small alar sclerite (Fig. 11). Occasionally a second vestigial alar sclerite is present, and in such cases females can be difficult to distinguish from *E. dispilus* as some overlap occurs in the antenna length. Coloration is usually generally red to brownish-red (less commonly more or less brown), typically with exception of yellowish areas of the face, clypeus, and gena. Often the mesosoma is much darker throughout or in patches variously distrib-

uted on the pronotum, mesopleuron, scutellum, and propodeum; wings vary from hyaline to slightly infumate.

Enicospilus debilis (Perkins),
combination reinstated

Fig. 12

Athyreodon hawaiiensis Ashmead 1901: 343. Holotype (by monotypy) male, Hawaii [Is.], Ola'a, (lost); preoccupied in *Enicospilus* by *E. hawaiiensis* (Ashmead 1900). Szépligeti 1905: 32. Perkins 1910: 679.

Abanchogastra debilis Perkins 1902: 141. Lectotype (designated by Cushman 1944: 54, not Townes et al. 1961: 274 as claimed) female [metasoma absent], [Oahu], Honolulu Mts [published as "Ko'olau range"], XII-02 (BPBM) [examined]; synonymized with *A. hawaiiensis* (Ashmead) by Cushman 1944. Szépligeti 1905: 33. Gupta 1987: 506.

Athyreodon debilis (Perkins); Perkins 1910: 680. Swezey 1915: 106. Perkins 1913: cx [in reference to the "smaller *Athyreodon*," presumably meaning *A. debilis*]

Abanchogastra hawaiiensis (Ashmead); Cushman 1944: 53. Cushman 1947: 464. Gauld 1985: 168. Yu and Horstmann 1997: 730.

Enicospilus debilis (Ashmead); Townes 1945: 737. Townes et al. 1961: 274.

Remarks.—This rarely collected species can be easily recognized by the combination of its small size (fore wing length 6.3–9.0 mm); brown, red, or orange coloration (with frequent exception of yellow parts of the face, clypeus, and gena; wings are hyaline to slightly infumate); slender mandibular teeth; absence of a posterior transverse carina of the mesosternum medially; and the lack of both a fenestra and sclerite in the fore wing discosubmarginal cell (Fig. 12).

Enicospilus dispilus Perkins

Fig. 13

Enicospilus dispilus Perkins 1902: 143. Holotype (Perkins' use of "the type" is herein regarded as an original holotype designation (ICZN 1999 Art. 73.1.1) female, [Oahu], Honolulu Mts [published as "Ko'olau range"], 1500 ft, XII-1901, R.C.L.P. [Perkins] (BPBM) [exam-

ined]. Perkins 1907a: 44. Perkins 1910: 670. Perkins 1915: 528. Swezey 1915: 105. Anonymous 1917: 286. Anonymous 1924: 345. Townes et al. 1961: 274. Gupta 1987: 527. Yu and Horstmann 1997: 737.

Enicospilus dispilus variety *pallipes* Perkins 1902: 143. Type not designated. Synonymized by Cushman 1944.

Henicospilus dispilus (Perkins); Szépligeti 1905: 27. Morley 1912: 49.

Enicospilus (*Enicospilus*) *dispilus* Perkins; Cushman 1944: 49.

Remarks.—This common, medium-sized to large species (fore wing length 11.0–17.0 mm) is similar to *E. bellator* and *E. castaneus* in the relatively flat and coarsely punctured dorsal part of the scutellum and the strongly curved, parallel-sided or basally swollen male pretarsal claw. It is distinguished from these species by the discosubmarginal cell which has two (rarely three) sclerites (Fig. 13), and with respect to *E. castaneus*, eyes more convex and a shorter malar space (especially in the male). In coloration it ranges from orangish or reddish-brown to dark brown throughout (usually with exception of yellowish parts of the face, clypeus, and gena); wings vary from hyaline to infumate (typically slightly infumate).

Enicospilus dorsolineatus, new species

Fig. 3A–C

Diagnosis.—This yellow to yellowish-brown species is easily recognized by the dorsomedial dark line on the mesoscutum and metasoma. Should additional material reveal color variation, it can further be distinguished by the very narrow gena (Fig. 3B) and long malar space (Fig. 3A).

Description.—Length of fore wing about 13.0 mm in female. **Head:** Mandible fairly slender, slightly to moderately twisted, basal ventral margin weakly concave; outer surface generally smooth, without a distinct basal concavity, sparsely setose along a weak diagonal groove; upper tooth 1.5× as long as lower tooth, about as wide as lower tooth at base. Labrum 0.3× as long

as broad, apical margin flat medially, rounded laterally or trapezoidal. Malar space $0.4\text{--}0.5\times$ as long as basal mandibular width. Clypeus in profile flat to weakly convex, proximal margin weakly distinct from lower face; in frontal view $1.3\text{--}1.4\times$ as broad as long, apical margin broadly flat and impressed medially, rounded laterally, finely colliculate or coriaceous. Lower face $0.6\times$ as broad as long, very lightly and evenly punctate (punctuation not denser or coarse medially). Compound eye large, moderately convex, head width in frontal view $1.0\text{--}1.1\times$ length (Fig. 3A). Gena with setae pale, declined forward; in dorsal view very narrow, strongly constricted behind compound eye (Fig. 3B); GOI = $3.6\text{--}3.9$. Ocelli large, posterior ocellus separated from compound eye by about $0.1\times$ its diameter, FI = 0.6 . Occipital carina dorsally rounded, ventrally ending just short of hypostomal carina. Flagellum in female $1.8\times$ length of fore wing, with 61 segments, mid segment $2.2\times$ as long as broad. **Mesosoma:** Mesoscutum moderately rounded anteriorly in profile, forming an angle of about 70° ; notauli weak or vestigial. Scutellum compact, in dorsal view $1.3\times$ as long as anterior width; upper surface convex, evenly and rather coarsely punctate (relative to mesoscutum); lateral carinae moderately weak, extending about $4/5$ scutellar length; posterior declined by about 40° in profile, lightly striate. Mesopleuron rugulo-punctate/striate; scrobe set in distinct depression; speculum weakly apparent; mesopleural sulcus with weak transverse ridges; epicnemial carina strong, medioventrally complete. Mesosternum with distinct lateral longitudinal depression behind epicnemial carina; posterior transverse carina present medioventrally. Lower metapleuron weakly convex, rugose, rugulostriate or coarsely punctate. Propodeum in profile weakly convex; setae pale, upright, posteriorly directed; spiracle narrowly oval, anterior furrow fairly shallow, rugostriate; anterior area $0.1\times$ total propodeal length; anterior transverse cari-

na weakly present medially; posterior transverse carina absent; spiracular area smooth medially, rugose laterally behind spiracle, $0.2\text{--}0.3\times$ total propodeal length; posterior area rugostriate anteriorly, rugose posteriorly. Separation between propodeum and lower metapleuron indicated by a weak furrow only (not carinate). Fore wing (Fig. 3C) pterostigma with distal end narrowed abruptly; discosubmarginal cell with 1 moderately large, triangular sclerite, the distal corner of which is attenuated relative to other corners; fenestra semicircular, extending apically to at least midpoint of Rs+2r, posterior margin extending to about $4/5$ the distance between Rs+2r and 1m-cu; Rs+2r much thickened in basal half and slightly sinuous; Rs+M nearly straight or slightly arched in basal half; 1m-cu strongly arched; AI = 0.8 ; CI = $0.3\text{--}0.5$; ICI = $0.7\text{--}0.8$; SDI = $1.0\text{--}1.1$; cu-a positioned proximal of Rs+M by $0\text{--}0.1$ length of cu-a; 1st subdiscal cell sparsely and evenly setose anteriorly and apically, lacking setae in at least proximal, ventral part. Hind wing with about 8 hamuli in distal set; 1st abscissa of Rs slightly concave proximally, 2nd abscissa straight; 2nd abscissa of Cu1 emerging much nearer 1A than M, CI = $0.2\text{--}0.3$. Fore leg tibia $10.2\text{--}10.6\times$ as long as wide, without an array of subapical spines on outer surface. Mid leg with coxa evenly colliculate; inner tibial spur $1.3\times$ as long as outer spur. Hind leg with coxa in lateral view $2.0\text{--}2.1\times$ as long as deep; trochantellus dorsally $0.2\times$ as long as broad; 4th tarsomere in female $2.1\text{--}2.2\times$ as long as broad in dorsal view; 5th tarsomere of female in dorsal view evenly broadened distally, $3.2\text{--}3.4\times$ as long as broad, in lateral view slightly curved; pretarsal claw of female long, with about 13 preapical teeth. **Metasoma:** Elongate; T2 in female $6.7\times$ as long as lateral height, $4.6\text{--}4.9\times$ as long dorsal width; thyridium tear-shaped, positioned posterior of anterior margin of T2 by $0.3\text{--}0.4\times$ length of T2. Ovipositor short and straight, about $0.4\times$ length of T2.

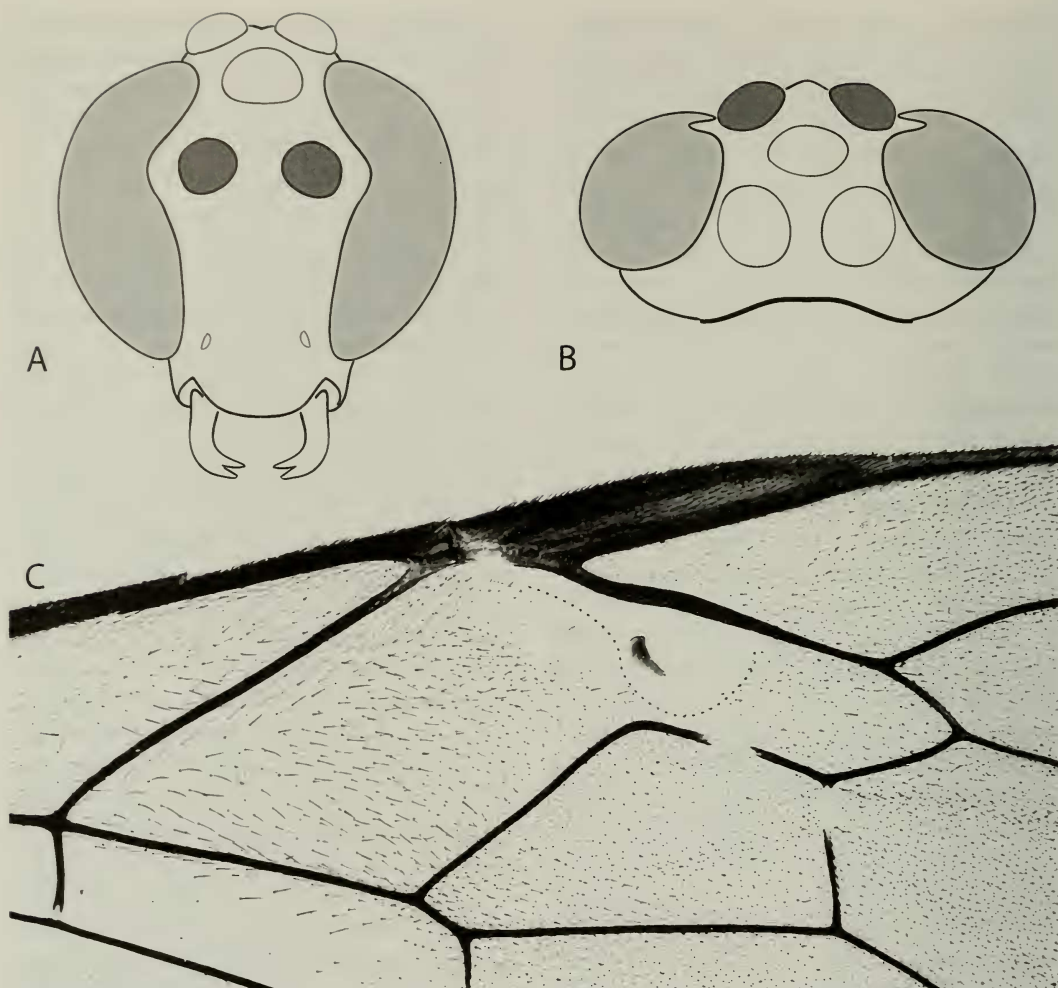


Fig. 3. *Enicospilus dorsolineatus*: A, frontal aspect of head; B, dorsal aspect of head; C, discal cell of fore wing.

Color: Generally brownish-yellow; head yellow throughout; mesoscutum with medial black stripe in anterior half; mesopleuron dark in specular area and broadly on mesosternum, anterior area of propodeal furrow with medial dark area; wings hyaline; legs brownish-yellow with apical tarsomeres darker; metasoma with dorso-medial black stripe on T3–T6 or T7.

Material examined.—**Holotype:** female, Hawaii, Hawaii Is.: Kilauea, October 1915, (W. M. Giffard) (BPBM). **Paratype:** female, same data as holotype except date 18 October 1916 (AEIC).

Etymology.—The species name is in reference to the dorsomedial stripe which is unique among Hawaiian Ophioninae.

Enicospilus elekino, new species
Fig. 4A–E

Diagnosis.—The combination of the characteristics of the mandible, clypeus shape, compound eye, ocelli, gena, mesopleuron, mesopleural sulcus, mesocoxa, mesosternum, and thyridium serve to differentiate it from the only other small, black, stout *Enicospilus* species, *E. kauaiensis* and *E. vitreipennis*.

Description.—Length of fore wing 7.5–8.9 mm in male. **Head:** Mandible stout, slightly twisted; basal ventral margin very weakly concave; outer surface with strong basal concavity, generally smooth except for a few scattered light punctures and a small proximal area of coriaceous sculpture, sparsely setose, without diagonal groove; upper tooth 1.1–1.2 \times as long as lower tooth, wider than or about equal in width to lower tooth at base. Labrum 0.3 \times as long as broad, apical margin evenly rounded. Malar space 0.6–0.8 \times as long as basal mandibular width. Clypeus in profile weakly to moderately convex, proximal margin clearly distinct from lower face; in frontal view 1.7–1.8 \times as broad as long, evenly colliculate and lightly punctate, apical margin broadly rounded, blunt to fairly sharp, not impressed. Lower face 0.8–0.9 \times as broad as long, evenly colliculate and lightly punctate. Compound eye reduced, head width 1.2–1.3 \times length in frontal view (Fig. 4A). Gena with setae fairly long, declined forward; in dorsal view broadly rounded behind compound eye (Fig. 4B); GOI = 1.3–1.7. Ocelli small, lateral ocellus removed from compound eye by 1.3–1.4 \times its diameter; FI = 0.2; occipital carina dorsally flat, ventrally joining or ending well before hypostomal carina. Flagellum in male 1.0–1.2 \times fore wing length, with 40–41 long segments, mid segment 1.9–2.1 \times as long as broad. **Mesosoma:** Mesoscutum in profile rounded, anterior angle 80°–90°; notauli absent or weak. Scutellum compact and fairly narrow in dorsal view, 1.1–1.3 \times as long as anterior width; upper surface convex, evenly colliculate; lateral carinae fairly weak (at least posteriorly), convergent posteriorly, extending about 3/4 or more scutellar length; posterior gradually declined, in profile forming an angle of 35°–45°. Mesopleuron evenly colliculate throughout; scrobe distinct; speculum not apparent; mesopleural sulcus strong, with stout ridges; epicnemial carina fairly weak, in one examined specimen evanescent at

posterior ventral corner, narrowly absent to evanescent medioventrally. Mesosternum with distinct lateral longitudinal depression behind lateroventral corner of epicnemial carina; posterior transverse carina broadly absent medially by about 1/2 mesosternal width. Lower metapleuron moderately or strongly convex, evenly colliculate. Propodeum compact, convex in profile, moderately setose with erect (not declined posteriorly), apically curved (in an anterior direction) setae, at least posteriorly; spiracle very narrow, in one specimen examined nearly occluded by semicircular or triangular extension of its anterior margin; anterior furrow strong, rugose, anterior area 0.1–0.2 \times total propodeal length; anterior transverse and posterior transverse carinae absent; spiracular area evenly colliculate; posterior area evenly colliculate medially, becoming rugostriate posteriorly. Separation between propodeum and lower metapleuron indicated by a moderate groove (at least medially) but without carina. Fore wing (Fig. 4C) with pterostigma long and fairly slender, apically abruptly tapered; discosubmarginal cell narrow, without sclerites, fenestra ill-defined as narrow area of reduced pubescence; Rs+2r slender and straight; Rs+M sinuous; 1m-cu evenly arched in basal half; AI = 0.8–0.9; CI = 0.3; ICI = 0.5–0.8; SDI = 1.2–1.4; cu-a anterior of Rs+M by 0.5–0.6 length of cu-a; 1st subdiscal cell very sparsely setose, less-so proximally. Hind wing with about 7 hamuli in distal set; 1st abscissa of Rs basally concave, 2nd abscissa straight; 2nd abscissa of Cu1 positioned just posterior of midpoint between M and 1A, convex, CI = 0.4. Fore leg with tibia compact, 5.5–6.0 \times as long as wide; fairly weak subapical spines scattered on anterior surface. Mid leg with distinct transverse stout ridges on dorsomedial surface of coxa; inner tibial spur 1.3 \times as long as outer spur. Hind leg with coxa in lateral view 1.6 \times as long as wide, evenly colliculate; trochantellus in lateral view 0.1–0.2 \times as dorsally long as broad; 4th tarsomere of

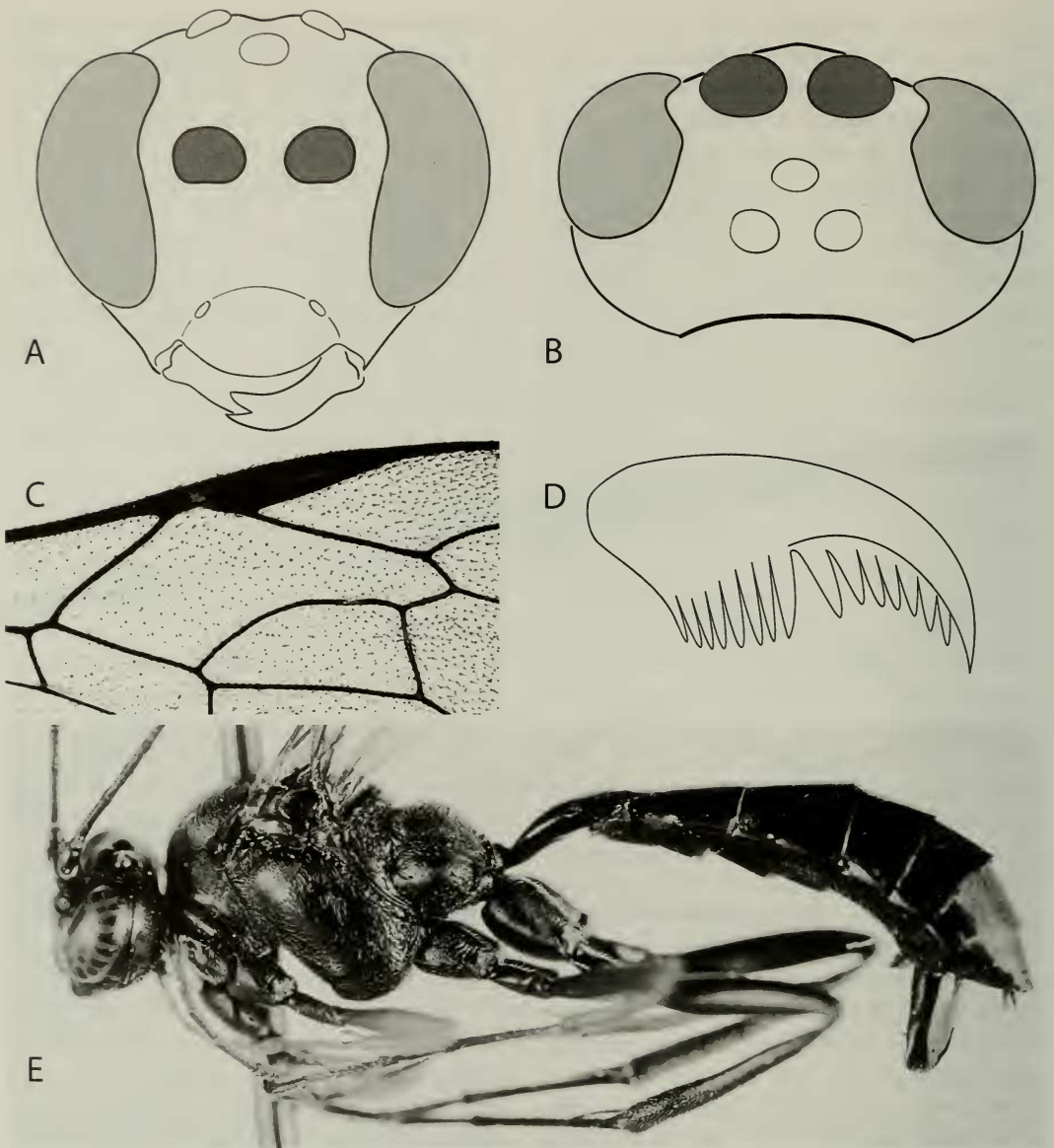


Fig. 4. *Enicospilus elekino*: A, frontal aspect of head; B, dorsal aspect of head; C, discosubmarginal cell of fore wing; D, male hind outer claw; E, lateral aspect of body.

male 1.4–1.8 \times as long as broad in dorsal view; apical tarsomere of male 2.6 \times as long as broad in dorsal view, straight in lateral view; hind outer pretarsal claw of male with teeth densely pectinate at least basally, teeth distributed evenly or divided once or more by a conspicuous space (Fig. 4D). **Metasoma** fairly narrow and slender in form yet dorsally rather broad (Fig. 4E); T2 1.2–1.5 \times as long as lateral height, 1.3–1.5 \times

as long as dorsal width; thyridium reduced, positioned posterior of anterior margin of T2 by 0–0.1 \times the length of T2.

Color: Generally black except femur, tibia, and tarsus of fore leg and tibia and tarsus of mid leg brown; wings slightly to distinctly infumate; setae of head with brown tint, that of propodeum pale.

Remarks.—The female of this species is unknown. Its discovery would be interesting

given its similarity to both *E. kauaiensis*, a species with a long, upcurved ovipositor, and *E. vitreipennis*, which has a short, straight ovipositor. Chances for its discovery may be good given that it was taken as recently as 1984 in a protected accessible area of Maui.

Material examined.—**Holotype**: Male, Hawaii, **Maui**, Haleakala, Makawao Forest Reserve, elevation 5700 ft, 17 June 1975 (R. Burckhart), "sweeping" (BPBM). **Paratype**: male, **Maui**, Haleakala, West slope, elevation 5500 ft, 4 June 1984 (A. C. Medeiros), on *D. plantaginea*.

Etymology.—The species name is a composite of the Hawaiian words *ele* and *kino* meaning "black" and "body," respectively. It is treated as a noun in apposition.

Enicospilus ferrugineus (Perkins),
reinstated combination
cf. Fig. 15

Pleuroneurophion ferrugineus Perkins 1915: 533.

Lectotype (designated by Townes et al. 1961: 274 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Maui, Haleakala, 2000 ft, R.C.L.P. [Perkins] (BPBM) [examined]; synonymized with *Enicospilus debilis* (Perkins) by Townes et al. 1961: 274; reinstated in *Enicospilus* by Townes and Townes 1973; synonymized with *Abanchogastra hawaiiensis* Ashmead by Yu and Horstmann 1997: 730.

Enicospilus (*Pleuroneurophion*) *ferrugineus* (Perkins); Cushman 1944: 46.

Enicospilus ferrugineus (Perkins); Townes and Townes 1973: 371. Gupta 1987: 532.

Remarks.—The species status of this nomen is dubious, though it is not near *Enicospilus debilis* (Perkins) with which it was once synonymized (see above). Other than differences in color and distribution listed in the key, it is virtually identical to *E. hawaiiensis* (Ashmead). As long as both of these differences hold, an argument can be made for its continued recognition.

Enicospilus fullawayi Cushman
Fig. 14

Enicospilus (*Eremotyloides*) *fullawayi* Cushman 1944: 45. Holotype (by monotypy and origi-

nal designation) female, Kauai, Halemanu, 8 June 1919, H. T. Osborn (USNM, #56661). Cushman 1947: 473.

Enicospilus fullawayi Cushman; Townes et al. 1961: 276. Gupta 1987: 536.

Remarks.—This rarely collected, medium-sized species (fore wing length 8.2–9.8 mm) can be recognized by its extremely slender metasoma (dorsomedial length of exposed portion of T5 in female, T4 in male, greater than lateral depth) combined with the broad fenestra containing a single, linear, posteriorly positioned sclerite (Fig. 14). Each of the relatively few known specimens is dark brown with frequent exception of yellow or whitish parts of the face, clypeus, and gena; the wings vary from hyaline to slightly infumate.

Enicospilus gladiator, new species
Fig. 5A–D

Diagnosis.—This species is easily recognized by the combination of an angulate 1m-cu vein with a short stub and two alar sclerites (the second may be translucent, it does not show in the figure), the proximal one medially positioned between veins Rs+2r and 1m-cu (Fig. 5C).

Description.—Length of fore wing 8.6–11.0 mm in female, 6.7–9.3 mm in male. **Head**: Mandible moderately slender, weakly twisted; basal ventral margin weakly to moderately concave; outer surface without strong basal concavity, sparsely to moderately setose with hairs fairly long and scattered, without diagonal groove; upper tooth long, 1.3–1.5× as long as lower tooth, about as wide as lower tooth at base. Labrum 0.2–0.3× as long as broad, apical margin broadly rounded to flat medially, appearing semicircular, triangular, or trapezoidal. Malar space 0.2–0.4× as long as basal mandibular width. Clypeus in profile moderately convex to more or less flat, proximal margin moderately to weakly distinct from lower face; in frontal view 1.7–1.9× as broad as long, apical margin broadly rounded to flat, sharp, weakly to

moderately impressed medially, lightly punctate and minutely to moderately colliculate. Lower face $0.7\text{--}0.8\times$ as broad as long, lightly punctate and/or colliculate (more strongly so medially in some specimens examined). Compound eye large and strongly convex, head width in frontal view $1.2\text{--}1.3\times$ length (Fig. 5A). Gena with setae short, inconspicuous and declined forward; in dorsal view slightly to moderately rounded behind compound eyes (Fig. 5B); $\text{GOI} = 1.9\text{--}2.8$. Ocelli large, posterior ocellus touching compound eye or separated by about $0.1\times$ its diameter, $\text{FI} = 0.5\text{--}0.6$. Occipital carina dorsally rounded, ventrally joining hypostomal carina. Flagellum in female about $1.2\times$ length of fore wing, with 41–45 segments, mid segment $1.7\text{--}2.1\times$ as long as broad; in male $1.4\text{--}1.6\times$ length of fore wing, with 44–47 segments, mid segment $1.9\text{--}2.1\times$ as long as broad. **Mesosoma:** Mesoscutum strongly rounded anteriorly in profile, anterior angle $75\text{--}90^\circ$; notauli distinct or indistinct. Scutellum in dorsal view $1.1\text{--}1.4\times$ as long as anterior width; upper surface weakly convex to nearly flat, colliculate, with or without minute transverse striations; lateral carinae moderately to strongly convergent, extending $4/5$ or more scutellar length; posterior declined by about 30° in profile. Mesopleuron with fine irregularly transverse striations (common) or evenly colliculate throughout (one examined specimen), scrobe small but distinct; set in shallow groove which may extend dorsally toward subalar prominence and define a speculum (not evident in some individuals, in these the relief of mesopleuron being rather even); mesopleural sulcus with fine to moderately stout transverse ridges; epicnemial carina strong, complete medioventrally. Mesosternum without lateral longitudinal depression; with posterior transverse carina present medioventrally. Lower metapleuron weakly to moderately convex, evenly colliculate to irregularly striate. Propodeum in profile rounded anteriorly, flat medially and posteriorly (in female at least, somewhat more

shallowly rounded to flat throughout in some males examined); moderately setose with setae posteriorly declined; spiracle narrow; anterior furrow strong, rugulose to irregularly striate, anterior area $0.1\text{--}0.2\times$ total propodeal length; anterior transverse carina present or absent, posterior transverse carina absent; spiracular area evenly colliculate, $0.2\text{--}0.3\times$ total propodeal length; posterior area rugulose to finely areolate, becoming weakly striate medially in some individuals. Separation between propodeum and lower metapleuron variously indicated by carina and/or by a furrow, each of which may be fully or in part absent. Fore wing (Fig. 5C) with pterostigma long, narrowed rather abruptly distally; discosubmarginal cell with 2 sclerites, the basal one large and semicircular, positioned medially within fenestra, many examined specimens with a ventral, linear extension, distal sclerite transversely linear, faint (not visible in figure), outlining distal margin of fenestra as well as ventral margin in some individuals, fenestra fairly long and broad, apical margin extending to about midpoint of $\text{Rs}+2\text{r}$, posterior margin extending to near 1m-cu ; $\text{Rs}+2\text{r}$ thickened and sinuous in basal half; $\text{Rs}+\text{M}$ straight or slightly arched in basal half; 1m-cu angulate medially with short knob-like stub; $\text{AI} = 0.9\text{--}1.9$; $\text{CI} = 0.5\text{--}0.6$; $\text{ICI} = 0.4\text{--}0.6$; $\text{SDI} = 1.0\text{--}1.3$; cu-a anterior of $\text{Rs}+\text{M}$ by $0\text{--}0.4$ length cu-a ; 1st subdiscal cell with a few scattered setae apically and/or medially. Hind wing with 1st abscissa of Rs slightly concave or straight basally, 2nd abscissa nearly straight; 2nd abscissa of $\text{Cu}1$ emerging much nearer 1A than M , $\text{CI} = 0.2\text{--}0.3$. Fore leg tibia $8.5\text{--}10.0\times$ as long as wide, without an array of subapical spines on outer surface. Mid leg with coxa evenly colliculate which may become minutely wrinkled dorsomedially; inner tibial spur $1.2\text{--}1.4\times$ as long as outer spur. Hind leg with coxa in lateral view $1.7\text{--}2.0\times$ as long as deep; trochantellus dorsally $0.5\text{--}0.8\times$ as long as broad; 4th tarsomere in female $2.7\text{--}2.8\times$ as long as broad in dorsal view, $2.7\text{--}3.2\times$ in male; 5th tarsomere of

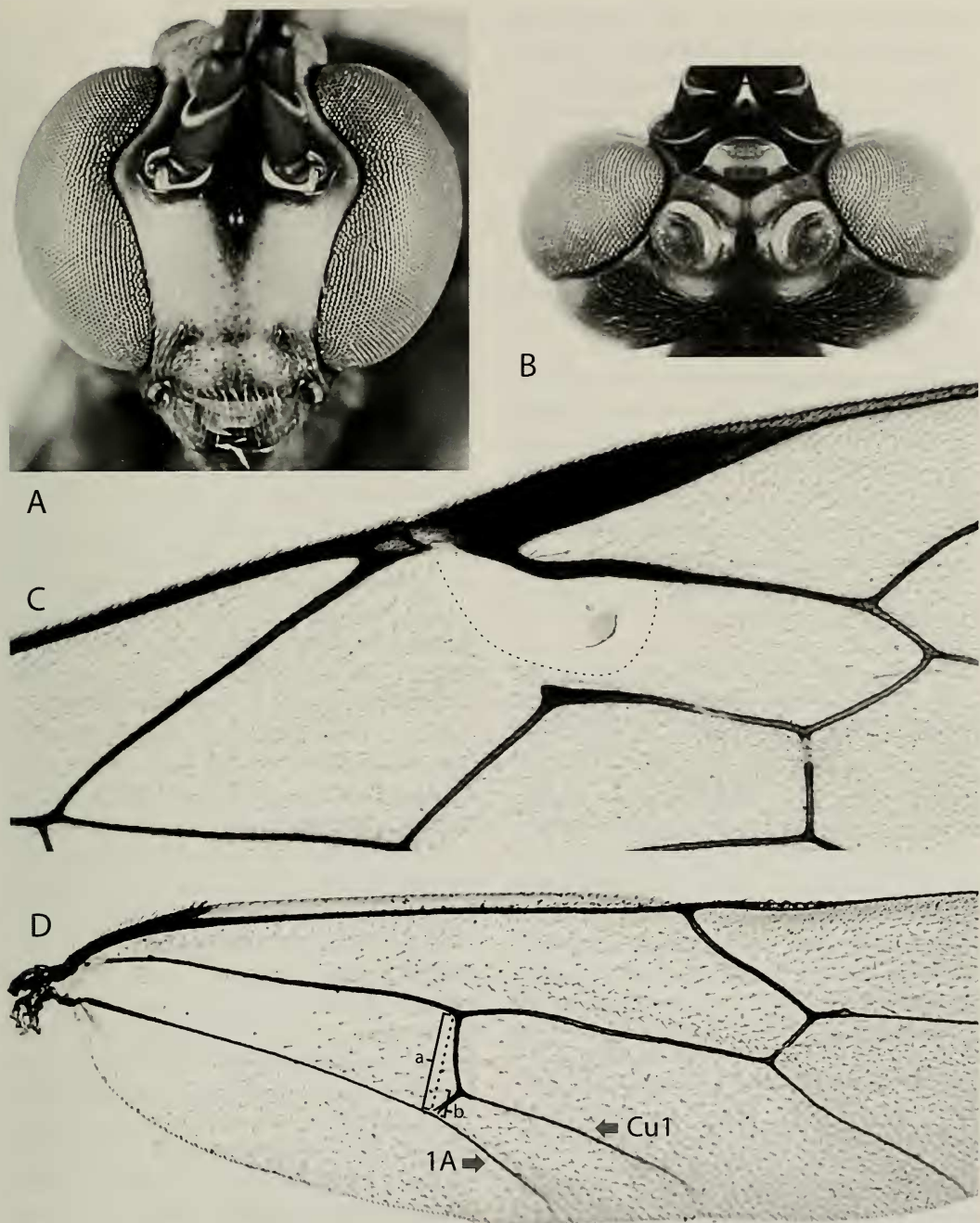


Fig. 5. *Enicospilus gladiator*: A, frontal aspect of head; B, dorsal aspect of head; C, discosubmarginal cell of fore wing; D, hind wing, cubital index = ratio of b to a.

female in dorsal view evenly broadened distally, 3.0–3.1× as long as broad, in lateral view nearly straight; 5th tarsomere of male in dorsal view somewhat abruptly widened

apically, 3.4–3.6× as long as broad, in lateral view nearly straight or slightly curved; pretarsal claw of female evenly curved, with 7–10 pre-apical teeth (cf. Fig. 6C);

pretarsal claws of male longer and densely pectinate (cf. Fig. 6D). **Metasoma:** Fairly compact and apically deep in female; T2 in female $4.8\text{--}5.7\times$ as long as lateral height, $2.7\text{--}3.6\times$ as long as dorsal width; T2 in male $5.2\text{--}8.9\times$ as long as lateral height, $4.3\text{--}6.2\times$ as long as dorsal width; thyridium tear-shaped to elliptical, positioned posterior of anterior margin of T2 by $0.3\text{--}0.4\times$ length of T2. Ovipositor long and straight, about $2.0\times$ length of T2, with slight swelling distal of midpoint.

Color: Generally evenly brown to brownish-red throughout, paler on face, behind compound eyes and, in some individuals, variously light brown on anterior pronotum, notaulus, subalar prominence, mesepimeron, and distal leg podites (other than apical tarsomeres and pretarsus which are dark); wings hyaline to slightly infumate; setae white to pale brown.

Material examined.—**Holotype:** female, Hawaii, **Kauai:** Kokee State Park, near main entrance, 22.1194° , -159.6670° , 1084 m elevation, 27–28 May 2006, UV light trap (D. J. Bennett) (BPBM). **Paratypes** (13, all from **Kauai**): 1 male, Kokee Camp, 3600 ft elevation, 29 March 1961 (D. F. Hardwick) (CNCI); 1 female, Kokee, 3400 ft elevation, 16 August 1961 (G. and J. Holland) (CNCI); 1 male, Na Pali-Kona Forest Reserve, Milolii Ridge, 3000 ft elevation, 26 June 1982 (K. and E. Sattler) (BMNH); 1 female, Kokee State Park, Kaluapuhi Trail, about 5 miles from lower trailhead, approximately 22.1432° , -159.6421° , 1150 m elevation, 28–29 May 2006, UV light trap (D. J. Bennett) (BPBM); 2 females, Kokee Road, 4000 ft elevation, 19 May 1982 (J. W. Beardsley) (BPBM); 1 female, Kumuwela, 8 August 1921, (Swezey) (BPBM); 2 males, Nualolo Valley, 3400 ft elevation, August 1952 (D. E. Hardy) (BPBM); 1 male, Kokee, 13–17 September 1965 (BPBM); 2 females, Kokee State Park, Discovery Center, 11 May 1998 (M. J. and C. A. Tauber) (BPBM); 1 female, Kokee, 4–6 August 1961 (Maa, Miyatake, and Yehimoto) (BPBM).

Etymology.—The species epithet, a Latin noun for “strong bearer,” is in reference to the long, straight ovipositor characteristic of this species.

Enicospilus hainesi, new species

Fig. 6A–E

Diagnosis.—The long, broad fenestra lacking alar sclerites is unique among Hawaiian Ophioninae (Fig. 6E). Also helpful in recognizing this species is the shape of 1m-cu and the long, straight ovipositor.

Description.—Length of fore wing 7.4–9.4 mm in female, 6.6–8.7 mm in male. **Head:** Mandible moderately slender to moderately stout, evenly or somewhat abruptly tapered proximally, slightly twisted; basal ventral margin at least slightly concave; outer surface with setae scattered or loosely aggregated medially, without diagonal groove, basal concavity shallow; upper tooth long, $1.2\text{--}1.5\times$ as long as lower tooth, about equal in width to lower tooth or the latter slightly wider at base. Labrum $0.2\text{--}0.3\times$ as long as broad, apical margin broadly rounded. Malar space $0.3\text{--}0.5\times$ as long as basal mandibular width. Clypeus in profile weakly to moderately convex, weakly to moderately distinct from lower face; in frontal view $1.6\text{--}2.0\times$ as broad as long, coriaceous to colliculate, sparsely and lightly punctate, apical margin sharp, broadly flat, weakly to distinctly impressed medially. Lower face $0.7\text{--}0.8\times$ as broad as long, lightly punctate and coriaceous to colliculate. Compound eye large and strongly convex, head width in frontal view $1.2\text{--}1.3\times$ length (Fig. 6A). Gena with setae short, inconspicuous and declined forward; in dorsal view moderately rounded behind compound eye (Fig. 6B); GOI = $2.2\text{--}3.1$. Ocelli large, lateral ocellus removed from compound eye by $0.1\text{--}0.2\times$ its diameter; FI = $0.4\text{--}0.6$. Occipital carina dorsally flat or broadly rounded, ventrally joining hypostomal carina. Flagellum in female $1.3\text{--}1.5\times$ length of fore wing, with 44–45 segments, mid segment $1.9\text{--}2.3\times$ as long as broad; in male $1.5\text{--}1.6\times$ length of fore wing, with 45–51 segments, mid segment $2.0\text{--}2.2\times$ as long as broad. **Mesosoma:** Mesoscutum strongly rounded in profile, anterior angle $70^\circ\text{--}80^\circ$; notauli

weak to distinct. Scutellum in dorsal view $1.2\text{--}1.4\times$ as long as anteriorly broad, with upper surface more or less flat to weakly convex, colliculate; lateral carinae moderately weak to moderately strong, moderately convergent, extending near entire scutellar length, albeit weakly so posteriorly; posterior declivity angled by $30^{\circ}\text{--}45^{\circ}$, striate, nearly smooth or colliculate. Mesopleuron colliculate and transversely rugulostriate; scrobe distinct or indistinct; speculum distinct or indistinct; mesopleural sulcus with weak transverse ridges; epicnemial carina strong, complete medioventrally. Mesosternum with or without shallow depression behind lateroventral corner of epicnemial carina; with posterior transverse carina complete medioventrally. Lower metapleuron moderately convex, colliculate and/or rugulose. Propodeum in profile weakly convex; with setae low-lying and posteriorly declined; anterior furrow strong, rugostriate, anterior area about $0.1\times$ total propodeal length; anterior transverse carina in female strong, extending laterally almost to lower metapleuron, in male narrowly present as a weak medial vestige; posterior transverse carina absent; spiracular area smoothly colliculate, $0.2\text{--}0.3\times$ total propodeal length; posterior area rugose becoming areolate in part posteriorly in some individuals. Separation between propodeum and metapleuron indicated by a weak furrow posteriorly and a distinct, evanescent, or irregular carina anteriorly. Fore wing (Fig. 6E) with pterostigma long, extending about $3/4$ the length of $Rs+2r$, fairly abruptly narrowed distally; discosubmarginal cell without sclerites (vestiges apparent in some individuals), fenestra moderately long and broad, extending apically to $2/3\text{--}3/4$ the length of $Rs+2r$ and posteriorly to near $1m\text{--}cu$; $Rs+2r$ thickened medially, at least slightly arched (rather than sinuous); $Rs+M$ slightly to distinctly arched, at least basally; $1m\text{--}cu$ strongly angulate medially with a distinct swelling or short stub projected anteroproximally; $AI = 1.5\text{--}2.6$;

$CI = 0.3\text{--}0.5$; $ICI = 0.2\text{--}0.3$; $SDI = 1.0\text{--}1.1$; $cu\text{--}a$ anterior of $Rs+M$ by $0.3\text{--}0.5$ length of $cu\text{--}a$; 1st subdiscal cell sparsely and evenly pubescent or nearly devoid of setae throughout. Hind wing with 5–6 hamuli in distal set; 1st abscissa of Rs slightly concave basally or sinuous, 2nd abscissa more or less straight; 2nd abscissa of $Cu1$ positioned well below midpoint between M and $1A$, $CI = 0.2\text{--}0.4$. Fore leg with tibia $7.4\text{--}9.1\times$ as long as wide, subapical spines absent or present as few and weak. Mid leg with coxa colliculate, becoming slightly rugulose dorsoposteriorly; inner tibial spur $1.2\text{--}1.4\times$ as long as outer spur. Hind leg with coxa in lateral view $1.5\text{--}1.8\times$ as long as deep, colliculate and at least slightly rugulose dorsoposteriorly; trochantellus $0.4\text{--}0.6\times$ as dorsally long as broad; 4th tarsomere of female $2.2\text{--}2.7\times$ as long as broad, $2.4\text{--}2.9\times$ in male; 5th tarsomere of female $2.4\text{--}2.9\times$ as long as broad, evenly broadened apically in dorsal view, nearly straight to slightly curved in lateral view; 5th tarsomere of male $3.1\text{--}3.3\times$ as long as broad, evenly broadened apically in dorsal view, in lateral view moderately curved; pretarsal claw of female and male approximately as figured (Fig. 6C, D). **Metasoma:** Apically deep in female; $T2\ 4.3\text{--}5.3\times$ as long as lateral height, $2.8\text{--}4.2\times$ as long as dorsal width; thyridium narrowly oval to tear-shaped, midpoint positioned posterior of anterior margin of $T2$ by $0.3\text{--}0.4\times$ length of $T2$. Ovipositor long and straight, about $2.1\times$ length of $T2$.

Color: Generally brown or reddish-brown; head lighter brown except variously darker on clypeus, face medially, frons, and posterior gena; wings hyaline to slightly infumate; legs slightly lighter than body except coxae (and in some individuals additional basal podites); setae white to pale brown.

Remarks.—This species is only known from rather recently collected material taken from within and near Honolulu. Despite the suspicious locality data (one such location is a Honolulu Pier), it is an obvious native Hawaiian insect, sharing

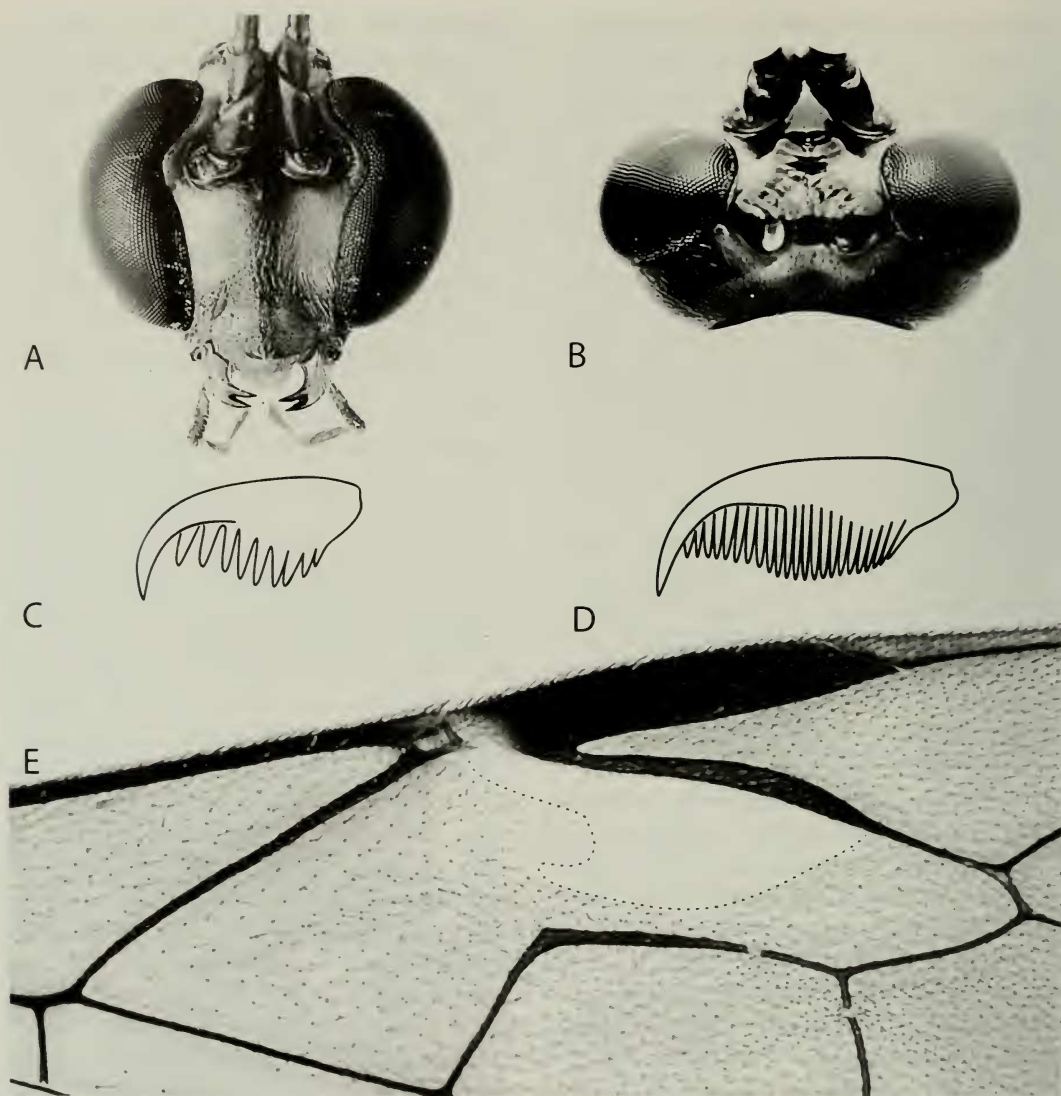


Fig. 6. *Enicospilus hainesi*: A, frontal aspect of head; B, dorsal aspect of head; C, male hind outer claw; D, female hind outer claw; E, discosubmarginal cell of fore wing.

typical general features of Hawaiian *Enicospilus* (colliculate punctation and lack of fore-tibial spines) and further resembles particular Hawaiian species such as *E. kaalae* (fenestra shape) and *E. hawaiiensis* (long, straight ovipositor). It is peculiar that it was never found by the early, prolific Hawaiian entomologists such as Perkins and Swezey who collected heavily in areas such as Tantalus where it occurs. The late Hymenopterist Dr. John Beardsley realized this conundrum and left a note on a specimen in

the BPBM postulating a switch to a non-native host as a possible explanation (one label even reads "Manoa vegetable garden"). Presumably under this scenario it was formerly rare and escaped capture but is more common now owing to this change. Discovery of the host range of this species both within Honolulu and its surrounding forests could be of potential general interest.

Material examined.—**Holotype**: female, Hawaii, Oahu, Mt. Tantalus, elevation 1900 ft, 20

September 1985 (W. E. Perreira) (BPBM). **Para-types** (12 all from **Oahu**): 1 female, Poamoho Trail summit, elevation 2500 ft, 5 May 1995 (A. Asquith) (BPBM); 1 female, 1 male, Manoa, 4 October 1984, "vegetable garden," (K. Rhoads) (BPBM); 1 female, Ko'olau Mts, Wiliwilinui Trail, 6 June 2006, UV light trap (J. Eiben and W. Haines) (Manoa); 2 females, 3 males, Waianae Mts, Honouliuli Preserve, Palikea Trail, elevation 2700 ft, 15–16 May 2006, UV light trap (W. Haines) (Manoa); 1 male, Honolulu, Pier 32, 28 November 1978, light trap (Beardsley) (BPBM); 1 female, 1 male, Kaluaa Gulch, 18 November 1984, (Perlman) (BMBP).

Etymology.—This species is dedicated to the Lepidopterist Will Haines who collected the majority of specimens known of this species.

***Enicospilus hawaiiensis* (Ashmead)**

Fig. 15

Pleuroneurophion hawaiiensis Ashmead 1900: 86. Holotype (by monotypy) female, Hawaii [presumably Hawaii Island], Koebele [Coll.] (USNM, #5553); transferred to *Enicospilus* by Cushman 1944. Ashmead 1901: 342.

Enicospilus (Pleuroneurophion) hawaiiensis (Ashmead); Cushman 1944: 46.

Enicospilus hawaiiensis [!] (Ashmead); Townes 1945: 737. Townes 1957: 116. Yu and Horstmann 1997: 741.

Enicospilus hawaiiensis (Ashmead); Cushman 1947: 466. Townes et al. 1961: 277. Gupta 1987: 539.

Remarks.—This small to medium-sized species (fore wing length 8.5–13.0 mm) can be recognized by the combination of its long, straight ovipositor; 1m-cu of fore wing with a medial stub (Fig. 15); discosubmarginal cell without a sclerite; and brown to slightly reddish-brown coloration (with typical exception of yellowish areas of the face, clypeus and gena; wings are hyaline or very slightly infumate).

***Enicospilus kaalae* Ashmead**

Fig. 16

Enicospilus kaalae Ashmead 1901: 347. Lectotype (designated by Townes et al. 1961: 278 [Perkins' (1910: 678) claim that the type of

this species is from Kauai is not herein regarded as a valid lectotype designation as it does not refer to an individual from Ashmead's syntype set as published.]) male, Oahu, Ka'ala Mts, 6500 ft (USNM). Perkins 1910: 278. Perkins 1913: cix. Perkins 1915: 524. Anonymous 1955: 386. Townes et al. 1961: 278. Gupta 1987: 545. Yu and Horstmann 1997: 742.

Enicospilus semirufus Perkins 1902: 142. Lectotype (designated by Townes et al. 1961: 278 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Oahu, Honolulu Mts [published as Ko'olau range] (BPBM) [examined]; synonymized by Perkins 1910.

Henicospilus kaalae (Ashmead); Szépligeti 1905: 27.

Henicospilus semirufus (Perkins); Szépligeti 1905: 27. Morley 1912: 52.

Enicospilus (Enicospilus) kaalae Ashmead; Cushman 1944: 47.

Remarks.—This large (fore wing length 12.5–17.5 mm) and common species (particularly on Kauai) is consistently colored dark brown to black on the mesosoma, petiole, and apically on the metasoma; the medial part of the metasoma is a characteristic deep reddish to orangish-brown, and the wings are hyaline to slightly infumate. It is further recognized by the broad fenestra with a single, posteriorly positioned, oval sclerite (Fig. 16).

***Enicospilus kauaiensis* (Ashmead),**

new combination

Fig. 17

Pycnophion kauaiensis Ashmead 1901: 344. Lectotype (designated by Townes et al. 1961: 295) female, Kauai, 4000 ft, VII.[18]96 (BMNH). Gupta 1987: 505. Yu and Horstmann 1997: 761.

Remarks.—This rare species is easily recognized by the combination of its small size (fore wing length about 8.0 mm); dark brown to black coloration (including face, clypeus and gena), weakly to distinctly infumate wings (particularly apically); long, upcurved ovipositor; evenly collicu-

late propodeum; and discosubmarginal cell without a fenestra or sclerite (Fig. 17).

Enicospilus lineatus (Cameron)

Figs 18, 19, 37

Ophion lineatus Cameron 1883: 192. Lectotype (designated by Townes et al. 1961: 279 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female [metasoma absent], Lanai, (BMNH); transferred to *Henicospilus* by Morley 1912 and to *Enicospilus* by Perkins 1915. Blackburn and Cameron 1886: 179. Blackburn and Cameron 1987: 240. Ashmead 1901: 341. Dalla Torre 1901: 192. Szépligeti 1905: 31.

Enicospilus mauicola Ashmead 1901: 347. Lectotype (designated by Townes et al. 1961: 279) female, Molokai, Mts, 4500 ft (USNM); synonymized with *E. lineatus* (Cameron) by Cushman 1944. Perkins 1907a: 44. Perkins 1915: 526.

Enicospilus henshawi Ashmead 1901: 349. Lectotype (designated by Townes et al. 1961: 279 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Hawaii [Is.], Hilo, May (lost); synonymized with *E. lineatus* (Cameron) by Perkins 1915.

Enicospilus dimidiatus Perkins 1902: 143. Lectotype (designated by Townes et al. 1961: 279 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Oahu, Wailua [published as Ko'olau range], 1500 ft, R.C.L.P. [Perkins] (BPBM) [examined]; synonymized with *E. mauicola* Ashmead by Perkins 1915 and with *E. lineatus* by Cushman 1944. Perkins 1907a: 44. Perkins 1910: 679.

Henicospilus mauicola (Ashmead); Szépligeti 1905: 27.

Henicospilus dimidiatus (Perkins); Szépligeti 1905: 27. Morley 1912: 52.

Henicospilus henshawi (Ashmead); Szépligeti 1905: 27.

Enicospilus capnodes Perkins 1910: 679. Lectotype (designated by Townes et al. 1961: 279 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) male, Hawaii [Is.], Kona, 3000 ft, (BPBM) [examined]; synonymized with *E. mauicola* Ashmead by Perkins 1915 and with *E. lineatus* by Cushman 1944.

Henicospilus lineatus (Cameron); Morley 1912: 47, 52. Uchida 1928: 219. Chu 1935: 14. Uchida 1937: 11. [All misidentifications of *Enicospilus lineolatus* (Roman) (according to Gauld and Mitchell 1981, and Gupta 1987) except second reference by Morley (page 52).]

Enicospilus funereus Perkins 1915: 525. Lectotype (here designated) female, w. [West] Maui, 1500 ft, III.02, R.C.L.P. [Perkins] (BPBM) [examined] [Townes et al. 1961: 279 erroneously described syntypes from other islands.]; synonymized with *E. lineatus* (Cameron) by Townes et al. 1961. Swezey and Williams 1932: 182. Cushman 1944: 51.

Enicospilus lineatus (Cameron); Perkins 1915: 526. Cushman 1944: 50. Iwata 1950 [misidentification, likely of *Enicospilus lineolatus* (Roman)]. Townes et al. 1961: 279. Lee and Kim: 1980: 11 [misidentification, likely of *Enicospilus lineolatus* (Roman)]. Gauld and Mitchell 1981: 8. Gupta 1987: 548. Yu and Horstmann 1997: 743.

Enicospilus ashmeadi Perkins 1915: 527. Lectotype (designated by Townes et al. 1961: 279) female, Hawaii [Is.], Kilauea, VII.03, (BPBM) [examined]; synonymized with *E. lineatus* (Cameron) by Cushman 1944. Anonymous 1925: 11.

Remarks.—This species displays an impressive amount of variation in features including size (fore wing length 8.5–16.4 mm), color (monochrome or mixed, ranging from dark brown or almost black to reddish-brown or orange, with frequent exception of yellowish areas of the face and gena; wings vary from slightly to strongly infumate), and the form of the alar sclerite (Figs 18, 19). This was pointed out by Cushman (1944) who synonymized a number of names under *E. lineatus*. Additional specimen material and a focused study of the variation and distribution of forms could potentially reveal cryptic species and/or forms representing early phases of divergence.

Enicospilus longicornis Ashmead

Figs 20, 36

Enicospilus longicornis Ashmead 1901: 350. Lectotype (designated by Townes et al. 1961: 280 [Their usage of "type" is herein regarded as

equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) male [labeled as female], Hawaii [Is.], Kilauea (BMNH). Perkins 1915: 524. Swezey and Williams 1932: 182. Townes et al. 1961: 280. Gupta 1987: 551. Yu and Horstmann 1997: 743.

Henicospilus longicornis (Ashmead); Szépligeti 1905: 27.

Enicospilus tyrannus Perkins 1910: 678. Lectotype (designated by Townes et al. 1961: 292 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Molokai, 4000 ft, II.02 (BPBM) [examined]; **new synonymy**. Perkins 1915: 524. Anonymous 1925: 11. Swezey and Williams 1932: 182. Cushman 1944: 53. Townes et al. 1961: 293. Yu and Horstmann 1997: 752.

Enicospilus (*Enicospilus*) *longicornis* Ashmead; Cushman 1944: 52.

Remarks.—This medium-sized to large species (forewing length 10.1–19.5 mm) is easily recognized by the distinctly down-curved ovipositor, heavily setose, diagonal groove of the mandible (Fig. 36), and at least two prominent alar sclerites (Fig. 20). The gena (widely), face below the toruli, and often the clypeus are largely yellow with the possible exception of the medial area; the mesosoma varies from orange to red-dish-brown throughout (typically in the smaller individuals) to a patchwork of brownish-yellow and dark brown areas; the metasoma varies from orange or reddish-brown to dark brown, either similar throughout or with the petiole noticeably darker; and the wings vary from slightly to distinctly infumate, often with a yellowish tint. As suspected by Cushman (1944), *E. tyrannus* represents the larger individuals among a continuum of variation in size and color.

Enicospilus melanochromus Perkins

Fig. 21

Enicospilus melanochromus Perkins 1915: 523. Lectotype (designated by Townes et al. 1961: 281 [Their usage of "type" is herein regarded as equivalent to a lectotype designation

(ICZN 1999: Art. 74.5).]) female, Maui, Haleakala, 2500 ft, III.02, R.C.L.P [Perkins] (BPBM) [examined]. Townes et al. 1961: 281. Gupta 1987: 554. Yu and Horstmann 1997: 744.

Enicospilus (*Enicospilus*) *melanochromus* Perkins; Cushman 1944: 47.

Remarks.—This medium-sized (fore wing length 9.1–10.5 mm) and rarely collected species is similar to *E. blackburni* but can be distinguished from the latter by its usual dark brown coloration (with possible exception of a yellowish face, clypeus and gena; one individual examined is orangish-brown throughout as in *E. blackburni*), moderately infumate wings, fore wing with a basally expanded fenestra (Fig. 21) and 1m-cu without an angle medially (though often thickened), and the apically swollen aedeagus.

Enicospilus minimus, new species

Fig. 7A–E

Diagnosis.—Owing to its unusual habitus, the difficulty in diagnosing this species for the uninitiated will be in recognizing it as an ophionine, and not one of the many small, introduced ichneumonoids among the Hawaiian fauna. Its small size, yellow and brown coloration, reduced ocelli, and vestigial fenestra allow for its identification to species.

Description.—Length of fore wing 3.7–4.3 mm in female. **Head:** Mandible moderately stout, more or less parallel-sided medially, weakly twisted; basal, ventral margin strongly concave; outer surface without strong basal concavity, sparsely setose with hairs scattered or aggregated medially but not along a distinct diagonal groove; upper tooth long, 1.7–1.8× as long as lower tooth, about as wide as lower tooth at base. Labrum concealed in examined specimens. Malar space 0.5× as long as basal mandibular width. Clypeus in profile weakly to strongly convex, proximal margin distinct from lower face; in frontal view 2.3–2.4× as broad as long,

colliculate, apical margin broadly flat, sharp, impressed medially. Lower face as broad as long, evenly colliculate. Compound eye reduced, head width in frontal view $1.3\text{--}1.4\times$ length (Fig. 7A). Gena with setae short, inconspicuous and declined forward; in dorsal view very broadly rounded behind compound eye (Fig. 7B), $GO = 1.1\text{--}1.4$. Ocelli small, posterior ocellus removed from compound eye by $0.8\text{--}0.9\times$ its diameter, $FI = 0.2\text{--}0.3$. Occipital carina dorsally rounded, ventrally ending well short of hypostomal carina. Flagellum in female $1.5\text{--}1.6\times$ length of fore wing, with 30–33 segments, mid segment $2.3\text{--}2.5\times$ as long as broad. **Mesosoma:** Mesoscutum strongly rounded anteriorly in profile, anterior angle about 90° ; notauli not impressed (though marked by darker color). Scutellum compact, in dorsal view $1.1\text{--}1.2\times$ as long as anterior width; upper surface strongly convex, evenly colliculate, lateral carinae present only anteriorly, extending about $1/10$ scutellar length; posterior declivity smooth or weakly striate, angled by about 45° in profile. Mesopleuron evenly colliculate throughout, evenly rounded with little variation in relief; scrobe small, distinct or indistinct, not set in shallow groove, speculum not apparent; mesopleural sulcus with weak transverse marks; epicnemial carina strong, complete medioventrally. Mesosternum without lateral longitudinal depression; with posterior transverse carina present medioventrally. Lower metapleuron moderately convex, evenly colliculate. Propodeum in profile weakly to moderately rounded anteriorly, flat medially and posteriorly; sparsely setose with setae low, inconspicuous, posteriorly declined; spiracle small, oval; anterior furrow shallow, rugostriate, $0.1\text{--}0.2\times$ total propodeal length; anterior transverse carina absent or present as a vestigial medial remnant, posterior transverse carina absent; spiracular area evenly colliculate, $0.2\text{--}0.3\times$ total propodeal length; posterior area coarsely or evenly colliculate, becoming rugulose or

rugulostriate posteriorly and posterolaterally. Separation between propodeum and lower metapleuron indicated by a complete furrow, not accompanied by a carina. Fore wing (Fig. 7C) with pterostigma short, wide, abruptly narrowed; discosubmarginal cell without sclerites, fenestra fairly small, round (ill-defined in one specimen examined), apical margin extending beyond midpoint of $Rs+2r$, posterior margin extending to about midway between $Rs+2r$ and $1m\text{--}cu$ or to nearer $1m\text{--}cu$; $Rs+2r$ straight or slightly arched, thickened in basal half $1/2$ to $3/4$; $Rs+M$ slightly arched in basal half; $1m\text{--}cu$ evenly arched; $3r\text{--}m$ absent or reduced to such extent that AI is about 3.2 ; $CI = 0.4\text{--}0.6$; $ICI = 0\text{--}0.4$; $SDI = 0.8\text{--}0.9$; $cu\text{--}a$ anterior of $Rs+M$ by $0.5\text{--}0.7$ length of $cu\text{--}a$; 1st subdiscal cell with a setae sparse and even in ventral half, lacking in anterior half. Hind wing (Fig. 7E) with 1st abscissa of Rs straight, 2nd abscissa entirely nebulous, nearly straight, continuing to wing margin; 2nd abscissa of $Cu1$ emerging much nearer $1A$ than M , $CI = 0.1\text{--}0.2$; $1A$ absent distal of $cu\text{--}a$. Fore leg tibia $7.8\text{--}8.2\times$ as long as wide, without subapical spines on outer surface. Mid leg with coxa evenly colliculate; inner tibial spur about $1.3\times$ as long as outer spur. Hind leg with coxa in lateral view $1.7\times$ as long as deep, evenly colliculate; trochantellus dorsally about $0.4\times$ as long as broad; 4th tarsomere in female $2.2\text{--}2.5\times$ as long as broad in dorsal view; 5th tarsomere of female in dorsal view evenly broadened distally, $4.5\text{--}6.0\times$ as long as broad, in lateral view nearly straight; pretarsal claw of female approximately as figured (Fig. 7D). **Metasoma:** Fairly compact and apically deep in female; $T2$ in female $2.4\text{--}3.3\times$ as long as lateral height, $2.5\text{--}3.0\times$ as long as dorsal width; thyridium tear-shaped to elliptical, positioned posterior of anterior margin of $T2$ by $0.2\times$ length of $T2$. Ovipositor short and straight, about $0.8\times$ length of $T2$.

Color: Head yellowish-brown, darker near ocelli, on frons, and gena; mesosoma trunk and legs brown and yellow; wings hyaline.

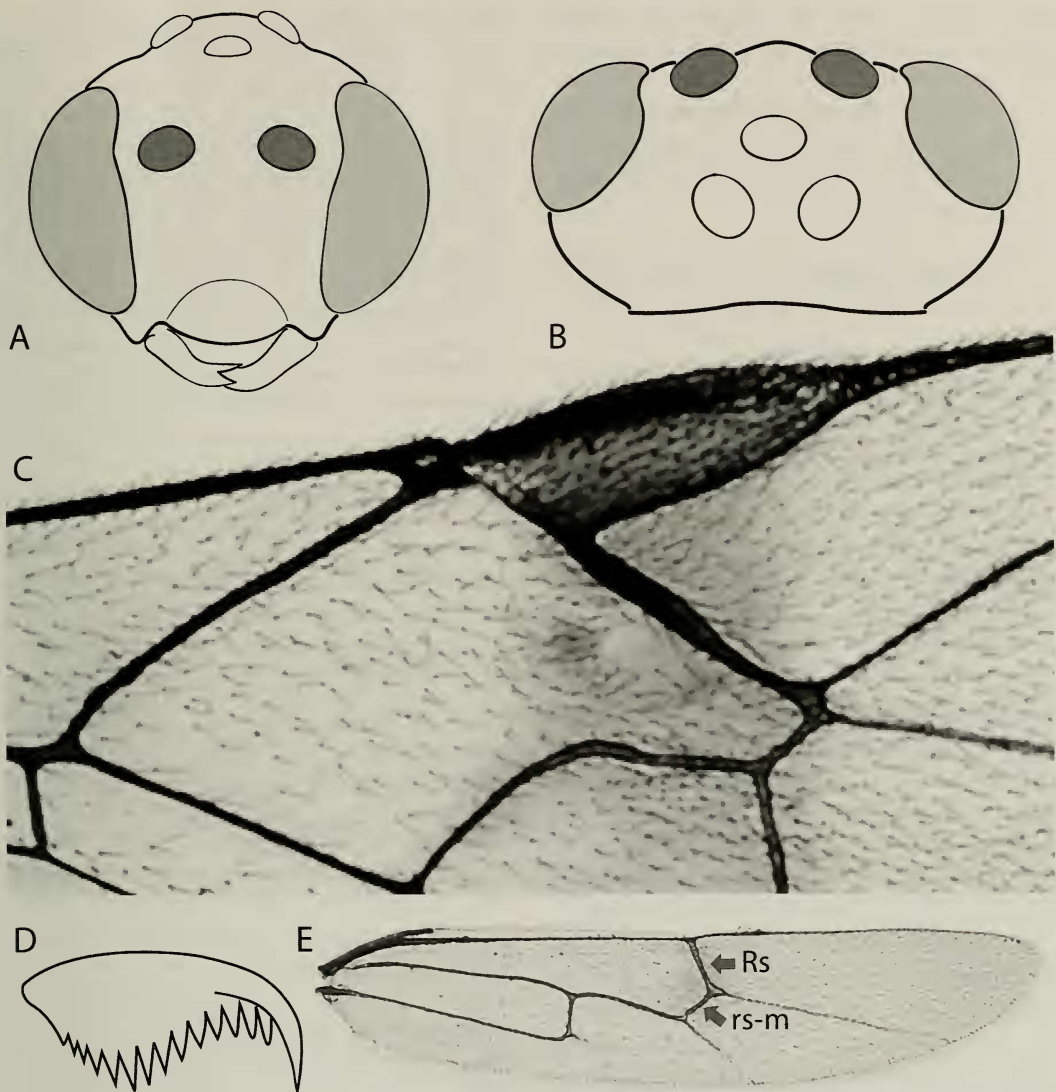


Fig. 7. *Enicospilus minimus*: A, frontal aspect of head; B, dorsal aspect of head; C, discusubmarginal cell of fore wing D, female hind outer claw; E, hind wing.

Remarks.—The minute size of *E. minimus* is unique among *Enicospilus* and probably Ophioninae in general. Its reduction has resulted in the extreme contraction of vein 3r-m of the fore wing, the presence of which is a synapomorphy for the subfamily (Gauld 1985). It is, however, recognizable as an *Enicospilus* owing to the slight twist of the mandible, vestigial fenestra, and the extension of the posterolateral area of the pronotum over the pronotal spirac-

ular sclerite. It seems to be allied to the other Hawaiian *Enicospilus* species and particularly resembles *E. petilus* in head shape and color pattern. Furthermore, it possesses the general apomorphic features for Hawaiian *Enicospilus* (colliculate punctation and loss of fore-tibial spines).

Material examined.—**Holotype:** female, Hawaii, **Hawaii Is.:** Near Wauhaula Heiau, 7 December 2006, (W. C. Gagné) (BPBM). **Para-**

type: female, Oahu, Waimano Trail, 1900 ft elevation, 1 February 1970 (W. C. Gagné) (BPBM).

Etymology.—The species epithet is Latin for "small", in reference to the minute size of this species as compared to all other *Enicospilus* species.

Enicospilus molokaiensis (Ashmead),
new combination
Fig. 22

Pycnophion molokaiensis Ashmead 1900: 87. Lectotype (herein designated) female, Molokai, Mts, 4500 ft, 7[?] IX 1893, Perkins (AEIC) [examined]. Ashmead 1901: 344. Dalla Torre 1901: 185. Szépligeti 1905: 71. Anonymous 1925: 11. Cushman 1947: 461. Townes 1957: 117. Townes et al. 1961: 295. Townes 1971: 80. Gauld 1985: 168. Gupta 1987: 505. Yu and Horstmann 1997: 761.

Remarks.—This species can be easily recognized by the combination of its stout form; moderately large size (fore wing 9.8–11.8 mm); large compound eyes; long, upcurved ovipositor; weakly setose fore wing (at least proximally); discosubmarginal cell without a distinct fenestra or sclerites (Fig. 22); evenly colliculate propodeum; and weak or absent medial part of the posterior carina of the mesosternum. It is largely black with possible exceptions of the face, gena, and clypeus which usually contain yellow or whitish areas; the fore leg, mid leg, and anterolateral and ventral areas of the mesosoma are usually red to orange in part, and the wings are distinctly infumate.

This combination is not to be confused with its junior homonym *Enicospilus molokaiensis* Ashmead 1901 (= *E. blackburni* Bennett). Townes et al. (1961) and Gupta (1987) include a record from Hawaii Island as part of Ashmead's syntype set, but I believe this is not correct. Ashmead (1901) did not list such a record in his publication, and I have seen no evidence indicating that this species occurs there.

Enicospilus niger (Ashmead),
reinstated combination
Figs 23, 24

Banchogastra nigra Ashmead 1900: 87. Holotype (by monotypy) female, Hawaii [Is.], Kilauea, IX.[18]95 (BMNH); transferred to *Enicospilus* by Townes 1945, and Townes et al. 1961. Ashmead 1901: 343. Dalla Torre 1901: 185. Szépligeti 1905: 71. Anonymous 1913: 203. Anonymous 1925: 11. Cushman 1947: 460. Townes 1971: 79. Gauld 1985: 169. Gupta 1987: 505. Yu and Horstmann 1997: 730.

Banchogastra nigri [!] Ashmead; Perkins 1907b: 97.

Enicospilus niger (Ashmead); Townes 1945: 737. Townes 1957: 102. Townes et al. 1961: 283.

Remarks.—This species is known from only a handful of specimens, and to my knowledge, it has not been collected since 1922. It can be recognized by the combination of its moderate size (fore wing length about 11.5 mm); highly stout form; compact and apically bulbous petiole that is further described in the key (Fig. 34); T2 wider than long in dorsal view; reduced compound eye; discosubmarginal cell of fore wing densely setose throughout without a fenestra or sclerite; coarsely rugose, areolate, or rugostriate propodeum with a strong anterior transverse carina; mid coxa without strong ridges dorsomedially; short, straight ovipositor; and coloration (head and mesosoma black, metasoma black to deep reddish-brown throughout, fore wing dark brown anteriorly, lighter in posterior, apical area).

Enicospilus nigrolineatus Ashmead
Fig. 24

Enicospilus nigrolineatus Ashmead 1901: 348. Lectotype (designated by Townes et al. 1961: 284) male, Lanai, 2000 ft, 1.1894, Perkins (BMNH); Perkins 1915: 524. Townes et al. 1961: 284. Gupta 1987: 559. Yu and Horstmann 1997: 746.

Henicospilus nigrolineatus (Ashmead); Szépligeti 1905: 27.

Enicospilus (*Enicospilus*) *nigrolineatus* Ashmead; Cushman 1944: 52.

Remarks.—This large species (fore wing length 12.5–16.5 mm) can be easily recognized by its light brown to yellow coloration with the exception of a dark brown or black line laterally on the metasoma and the following black areas: scutum medially, mesosternum, and propodeum dorsomedially; wings are more or less hyaline. The second alar sclerite is linear and lies along the posterior, apical margin of the fore wing fenestra (Fig. 24). *Enicospilus variegatus*, which can be similar in this respect, is always more extensively covered in dark brown or black areas (see below).

Enicospilus orbitalis (Ashmead)

Fig. 25

Eremotylus orbitalis Ashmead 1901: 345. Lectotype (designated by Townes et al. 1961: 285) female, Kauai, 2000–3000 ft, I.II.[18]97 (BMNH); transferred to *Eremotylodes* by Perkins 1915 [Perkins didn't state a type species for his *Eremotylodes* but he apparently intended it to be *E. orbitalis* Ashmead 1901 (see also discussion in Cushman 1947: 472).]. Szépligeti 1905: 36. Swezey and Bryan 1927: 412.

Eremotylodes orbitalis (Ashmead); Perkins 1915: 532. Anonymous 1925: 11. Swezey and Williams 1932: 182.

Enicospilus (*Eremotylodes*) *orbitalis* (Ashmead); Cushman 1944: 44.

Enicospilus orbitalis (Ashmead); Townes 1945: 737. Cushman 1947: 472. Townes et al. 1961: 285. Gupta 1987: 562. Yu and Horstmann 1997: 746.

Remarks.—This small to medium-sized species (fore wing length 6.5–11.5 mm) is relatively common in areas such as Kauai's Alakai swamp. It can be easily recognized by the combination of an extremely slender metasoma (dorsomedial length of exposed portion of T5 in female, T4 in male, greater than lateral depth) and the forewing discosubmarginal cell with a rather small, round fenestra lacking a sclerite (Fig. 25). Additionally, the ovipositor is short and slightly or distinctly upcurved; coloration is more or less evenly brown throughout,

with the possible exception of the face, clypeus, and gena, which are usually narrowly or broadly yellowish; and the wings are hyaline to slightly infumate.

Enicospilus perkinsi Cushman

Fig. 26

Enicospilus (*Eremotylodes*) *perkinsi* Cushman 1944: 44. Holotype (by original designation) female, July 6, 1937, E. C. Zimmerman Oahu, at light (BPBM).

Enicospilus perkinsi Cushman; Townes et al. 1961: 286. Gupta 1987: 564. Yu and Horstmann 1997: 747.

Remarks.—This rarely collected, medium-sized species (fore wing length 9.0–11.0 mm) is easily recognized by the combination of an extremely slender metasoma (dorsomedial length of exposed portion of T5 in female, T4 in male, greater than lateral depth) and the distinctly orange head and metasoma which contrast with the darker metasoma (at least apically). Additionally, the ovipositor is upcurved; the fore wing discosubmarginal cell contains a round fenestra and a distinct, oval sclerite (Fig. 26); and the wings are slightly infumate, with a yellowish tint.

Enicospilus petilus, new species

Fig. 8A–D

Diagnosis.—This species can be easily recognized by its greatly attenuated metasoma and very large proximal alar sclerite (Fig. 8D).

Description.—Length of fore wing 7.0–8.3 mm in female, 6.3–7.7 mm in male. **Head:** Mandible moderately stout, moderately twisted; basal ventral margin moderately to rather strongly concave; outer surface with a moderate basal concavity, sparsely to moderately setose along a weak diagonal groove; upper tooth 1.0–1.3× as long as lower tooth, about as wide or slightly narrower than lower tooth at base. Labrum 0.2–0.3× as long as broad, apical margin broadly rounded or flat medially.

Malar space $0.5\text{--}0.6\times$ as long as basal mandibular width. Clypeus in profile nearly flat to weakly convex, proximal margin weakly to moderately distinct from lower face; in frontal view $1.6\text{--}2.0\times$ as broad as long, lightly punctate and finely colliculate, apical margin broadly rounded or broadly flat, sharp, not impressed medially. Lower face $0.9\text{--}1.2\times$ as broad as long. Compound eye reduced, head width in frontal view $1.2\text{--}1.3\times$ length (Fig. 8A). Gena with setae inconspicuous, short, pale, and declined forward; in dorsal view broadly rounded behind compound eye (Fig. 8B), $\text{GOI} = 1.5\text{--}2.3$. Ocelli reduced, posterior ocellus separated from compound eye by $0.4\text{--}0.6\times$ its diameter, $\text{FI} = 0.3\text{--}0.4$. Occipital carina dorsally flat or rounded, ventrally joining or ending short of hypostomal carina. Flagellum in female $1.3\times$ length of fore wing, with 43–45 segments, mid segment $2.3\text{--}2.5\times$ as long as broad; in male $1.3\text{--}1.5\times$ length of fore wing, with 41–44 segments, mid segment $2.3\text{--}2.4\times$ as long as broad. **Mesosoma:** Mesoscutum strongly rounded anteriorly in profile; notauli weak or not apparent. Scutellum short, rounded, in dorsal view $1.1\text{--}1.3\times$ as long as anterior width; upper surface strongly convex, evenly and smoothly colliculate; lateral carinae more or less absent to weakly present through about $1/2$ scutellar length; posterior declined by $30^\circ\text{--}40^\circ$ in profile. Mesopleuron evenly colliculate throughout, rather flat and evenly rounded; scrobe small but clearly apparent, set in very shallow depression; speculum weakly apparent to absent; mesopleural sulcus with weak transverse ridges; epicnemial carina strong, medioventrally complete or narrowly absent. Mesosternum without lateral longitudinal depression behind epicnemial carina; with posterior transverse carina present medially. Lower metapleuron weakly to moderately convex, evenly colliculate to rugulose. Propodeum in profile weakly convex anteriorly and flat posteriorly to moderately convex throughout; exceeding-

ly sparsely setose (except one examined specimen moderate in this regard) with setae lying low and posteriorly declined; spiracle narrow; anterior furrow shallow, forming a broad concavity rather than a sharp groove, coarsely rugostriate, anterior area $0.1\text{--}0.2\times$ total propodeal length; anterior transverse carina present or absent, posterior transverse carina absent or present; spiracular area finely colliculate, about $0.3\times$ total propodeal length; posterior area anteriorly rugulose becoming rugostriate posteriorly. Separation between propodeum and lower metapleuron indicated by a weak furrow and weak, irregular carina. Fore wing (Fig. 8D) with pterostigma short and triangular, distal end narrowed abruptly; discosubmarginal cell with 2 sclerites, the basal one very large, semicircular or roughly triangular, the distal one linear, partially outlining distal ventral margin of fenestra; fenestra semicircular, extending apically to at least midpoint of $\text{Rs}+2\text{r}$, posterior margin extending to about $2/3$ the distance between $\text{Rs}+2\text{r}$ and 1m-cu ; $\text{Rs}+2\text{r}$ thickened medially and sinuous; $\text{Rs}+\text{M}$ nearly straight or slightly arched in basal half; 1m-cu evenly arched; $\text{AI} = 1.5\text{--}2.1$; $\text{CI} = 0.3\text{--}0.4$; $\text{ICI} = 0.2\text{--}0.3$; $\text{SDI} = 0.9\text{--}1.3$; cu-a positioned directly opposite base of $\text{Rs}+\text{M}$; 1st subdiscal cell sparsely setose throughout or only in posterior part. Hind wing with 4–6 hamuli in distal set; 1st abscissa of Rs nearly straight or slightly concave basally, 2nd abscissa straight; 2nd abscissa of Cu1 emerging much nearer 1A than M , $\text{CI} = 0.2$. Fore leg tibia $7.7\text{--}8.7\times$ as long as wide, without an array of subapical spines on outer surface. Mid leg with coxa evenly colliculate; with inner tibial spur $1.3\text{--}1.5\times$ as long as outer spur. Hind leg with coxa in lateral view $1.6\text{--}1.7\times$ as long as deep; trochantellus dorsally $0.3\text{--}0.5\times$ as long as broad; 4th tarsomere in female $2.0\text{--}2.1\times$ as long as broad in dorsal view, about $2.2\times$ in male; 5th tarsomere of female in dorsal view evenly broadened distally, $2.8\text{--}3.1\times$ as long as broad, in lateral view weakly curved; 5th

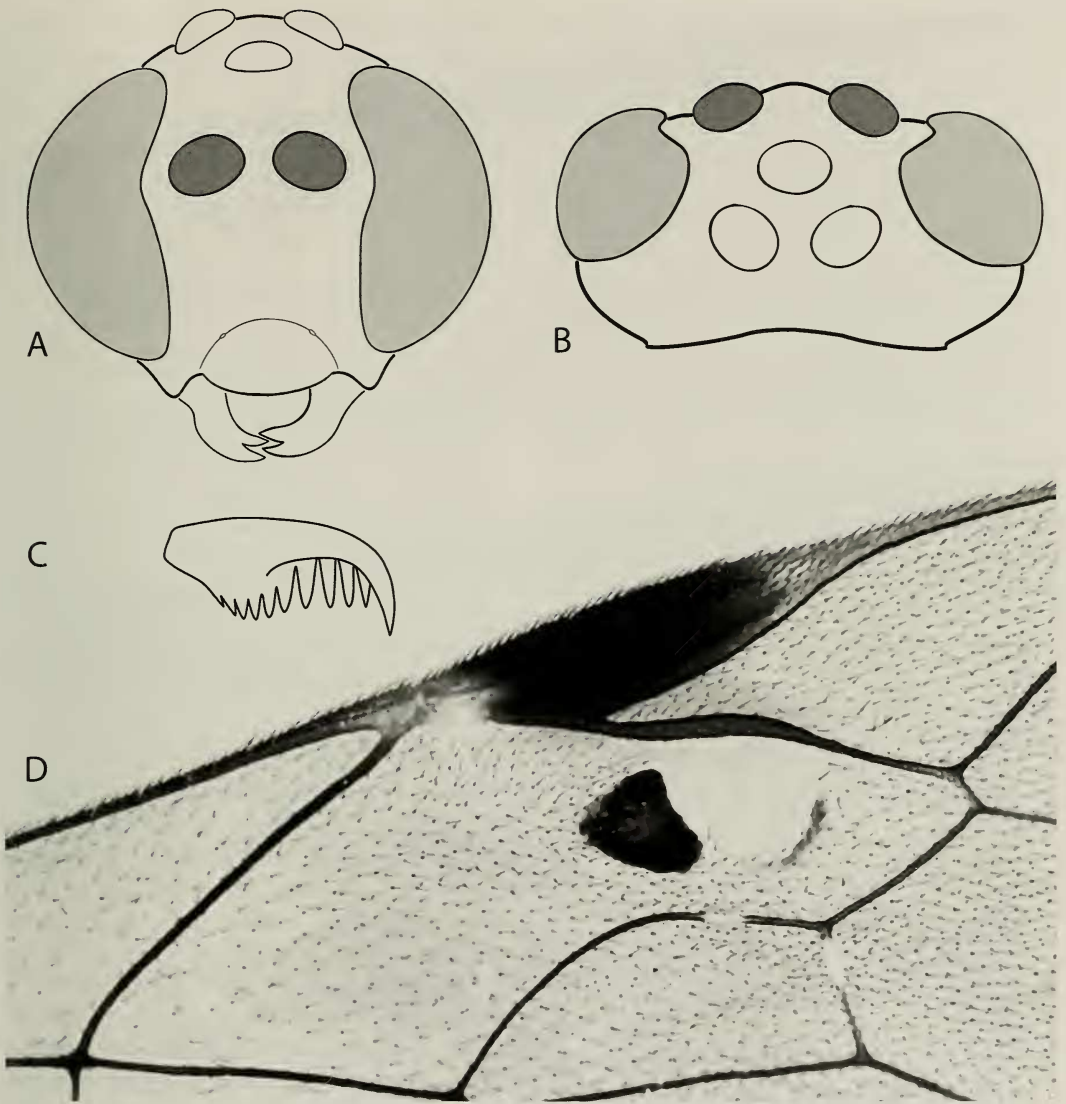


Fig. 8. *Enicospilus petilus*: A, frontal aspect of head; B, dorsal aspect of head; C, female hind outer claw; D, discosubmarginal cell of fore wing.

tarsomere of male in dorsal view somewhat abruptly widened apically, about $3.5\times$ as long as broad, in lateral view weakly curved; pretarsal claw approximately as in Fig. 8C, apparently with little or no sexual dimorphism. **Metasoma:** Very elongate (especially in female), narrowed and laterally flattened apically in female; T2 in female $4.3\text{--}5.3\times$ as long as lateral height, $3.0\text{--}3.5\times$ as long as dorsal width; T2 in male about $4.5\times$ as long as lateral height, $2.4\text{--}4.9\times$ as long as dorsal width;

thyridium tear-shaped, positioned posterior of anterior margin of T2 by $0.3\text{--}0.4\times$ length of T2. Ovipositor short and straight or slightly upcurved.

Color: Generally yellow and brown; head yellowish-brown, darker on dorsal gena and antenna; mesosoma brown with yellow patches on mesoscutum, medially on scutellum, and variously on mesopleuron and propodeum; wings hyaline; legs yellow to yellowish-brown with apical tarsomeres, hind coxa and femur (at least

in part) darker; metasoma with basal half or more of petiole pale yellow or yellowish-brown, otherwise brown except for various ill-defined lighter intersegmental areas which are lighter.

Material examined.—**Holotype**: female, Hawaii, **Maui**: Haleakala National Park, upper Kipahulu Valley, "Charlie Camp"; 1450 m elevation, 28 February–4 March 1984, UV light trap in forest (W. C. Gagné, S. Gon III) (BPBM). **Paratypes** (4): 1 female, **Hawaii**: Kilauea, "29 mi," August 1912 (W. M. Giffard) (AEIC); 1 female, **Molokai**: Pepeopae, 4000 ft elevation, 30 July 1959 (D. E. Hardy) (BPBM); 1 male, **Molokai**: West end of Hanalililo Trail, 1070 m, 7 January 1981, M. V. light, (W. C. Gagné) (BPBM); 1 male, **Hawaii**: Manuka Forest Reserve, South Kona, Kopua T. [Trail?], 3600 ft elevation, 22 June 1977, night, (R. S. Villegas and S. M. Gon III) (BPBM).

Etymology.—The species epithet, a Latin adjective for "slender," is in reference to the extremely elongate metasoma of the female.

Enicospilus pseudonymus Perkins

Fig. 27

Enicospilus pseudonymus Perkins 1915: 529. Lectotype (designated by Townes et al. 1961: 286 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) male, Maui, Haleakala, 4000 ft (BPBM) [examined]. Anonymous 1925: 10. Cushman 1944: 53. Townes et al. 1961: 286. Gupta 1987: 568. Yu and Horstmann 1997: 748.

Remarks.—This rarely collected, fairly large species (fore wing length 12.0–13.2 mm) can be recognized by the unique lateral, longitudinal depressions of the posterior mesonotum and scutellum. Additionally, the upper mandibular tooth is shorter than the lower tooth; the fore wing discosubmarginal cell lacks a sclerite and contains a fenestra which is at most a rather narrow, poorly defined region of reduced pubescence (Fig. 27); and the posterior transverse carina of mesosternum is absent or weak medially

(often weak medially and absent submedially). It is more or less orangish-brown with exception of the face, clypeus, and gena, which are largely yellow, as well as parts of the mesonotum, mesopleuron, propodeum, and petiole, which are often slightly or distinctly darker; the wings are hyaline.

Enicospilus swezeyi, new name

Fig. 1

Pycnophion fuscipennis Perkins 1910: 680. Lectotype (designated by Townes et al. 1961: 295 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Kauai, 3000 ft, winter 1901 (BPBM) [examined]; preoccupied in *Enicospilus* by *E. fuscipennis* (Szépligeti 1906). Anonymous 1925: 11. Swezey 1931: 502. Townes et al. 1961: 295. Gupta 1987: 505. Yu and Horstmann 1997: 761.

Pycnophion fumipennis [!] Perkins; Cushman 1947: 462.

Remarks.—This distinctive, small to medium-sized species (fore wing length 8.2–10.7 mm) can be recognized by its highly contrasting red and black coloration (Fig. 1); a long, straight ovipositor; propodeum posteriorly rugose, without an anterior transverse carina, with posteriorly projecting setae dorsomedially; lack of both a sclerite and a clearly defined fenestra in the fore wing discosubmarginal cell; distinctly infumate wings; and a weak or absent posterior transverse carina of the mesosternum.

Etymology.—The new name is dedicated to the prolific Hawaiian entomologist, Otto Swezey, whose efforts in the rearing of Hawaiian insects over many years (Swezey 1954) resulted in many discoveries including the host for this species, as elaborated on above.

Enicospilus variegatus Ashmead

Fig. 28

Enicospilus variegatus Ashmead 1901: 348. Lectotype (designated by Townes et al. 1961: 293) male, Hawaii [Is.], Ola'a, II.1896 (BMNH).



9. *Enicospilus bellator*

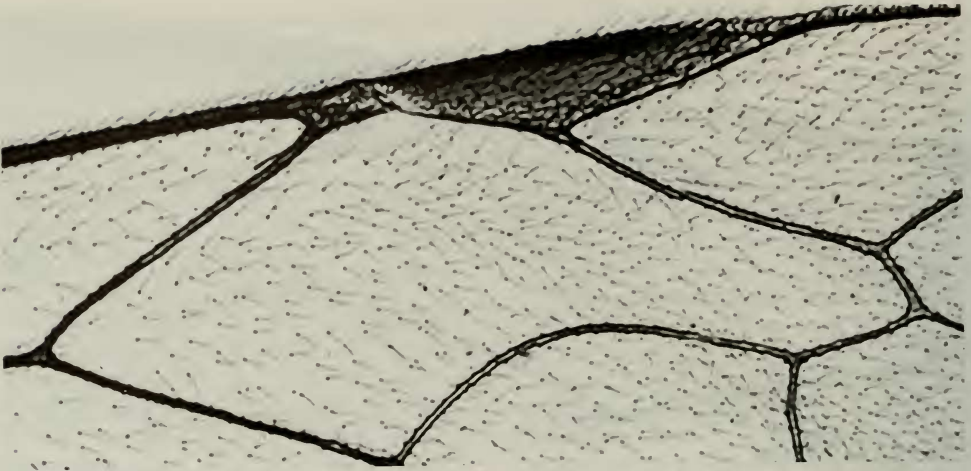


10. *Enicospilus blackburni*



11. *Enicospilus castaneus*

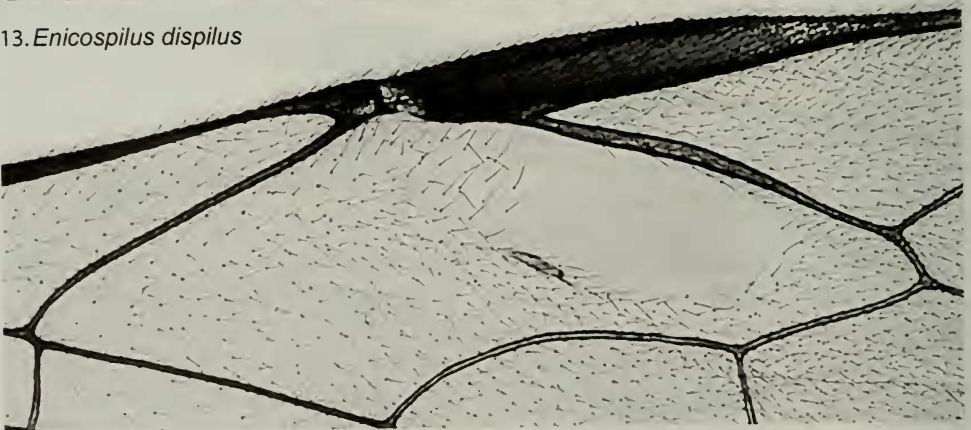
Figs 9–11. Fore wing discal cells.



12. *Enicospilus debilis*

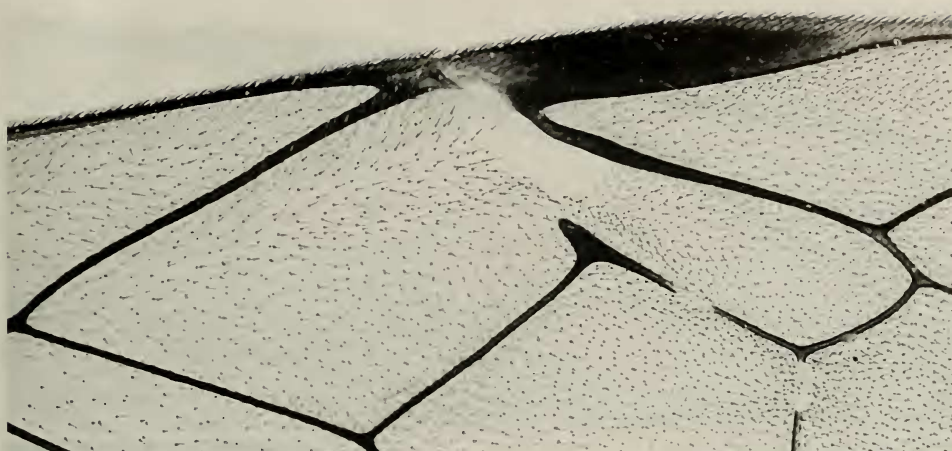


13. *Enicospilus dispilus*

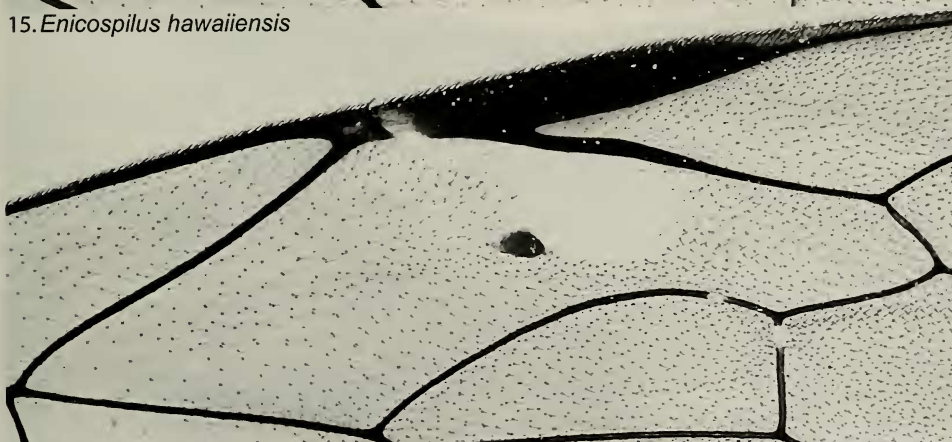


14. *Enicospilus fullawayi*

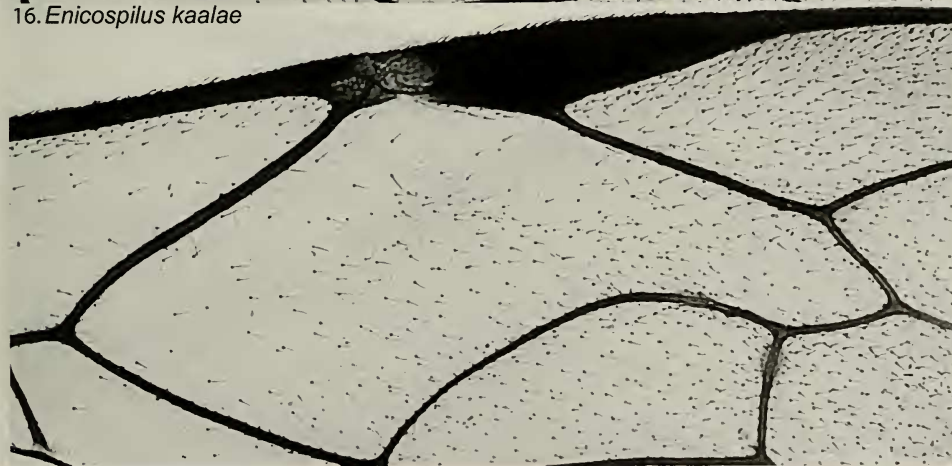
Figs 12-14. Fore wing discal cells.



15. *Enicospilus hawaiiensis*



16. *Enicospilus kaalae*



17. *Enicospilus kauaiensis*

Figs 15–17. Fore wing discal cells.



18. *Enicospilus lineatus*



19. *Enicospilus lineatus*

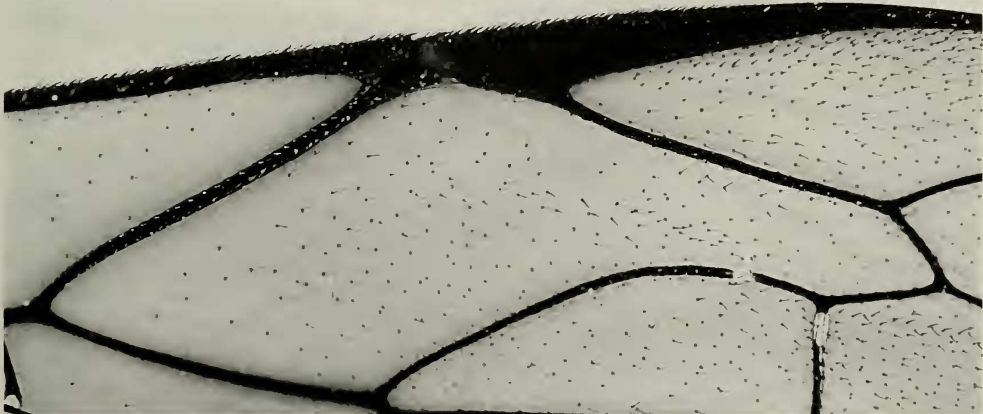


20. *Enicospilus longicornis*

Figs 18–20. Fore wing discosubmarginal cells.



21. *Enicospilus melanochromus*



22. *Enicospilus molokaiensis*

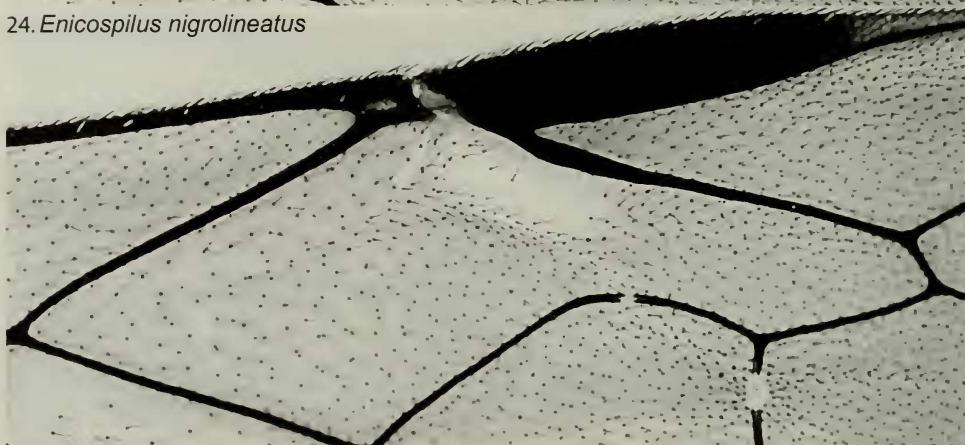


23. *Enicospilus niger*

Figs 21–23. Fore wing discal cells.



24. *Enicospilus nigrolineatus*

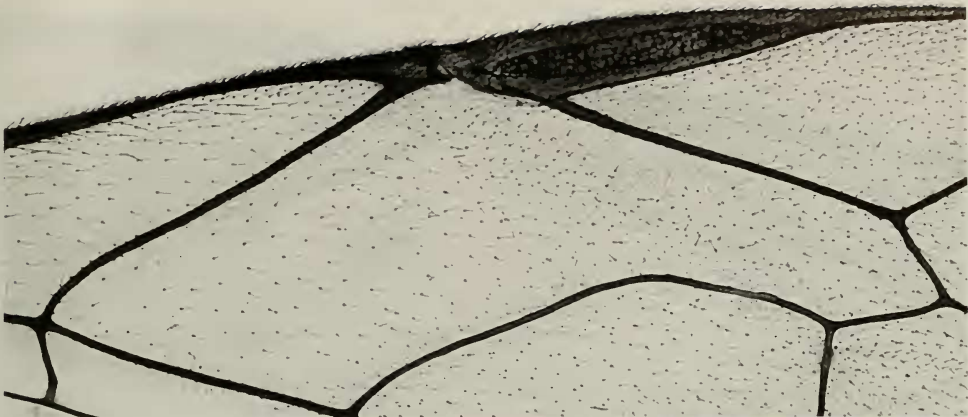


25. *Enicospilus orbitalis*

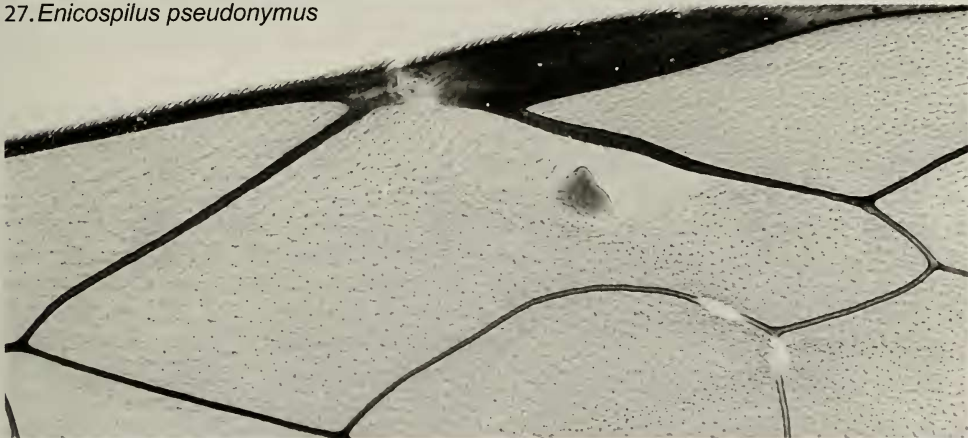


26. *Enicospilus perkinsi*

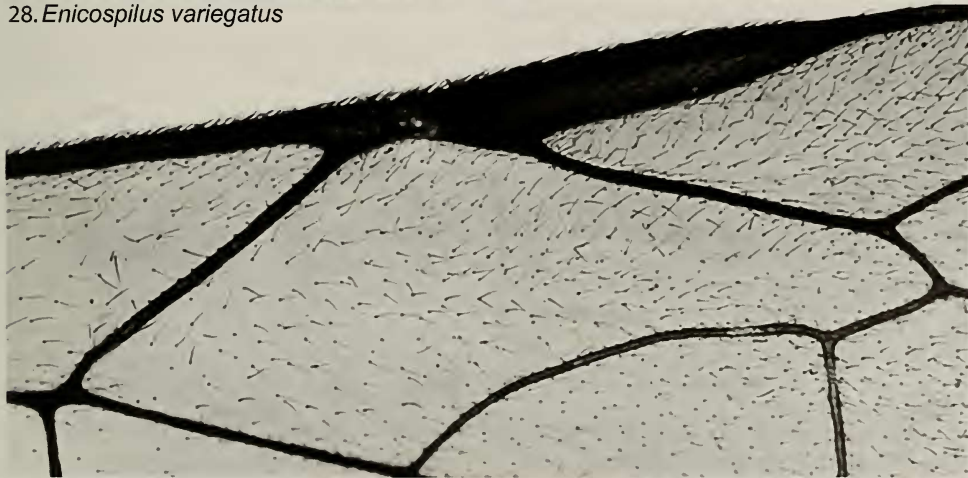
Figs 24–26. Fore wing discal cells.



27. *Enicospilus pseudonymus*

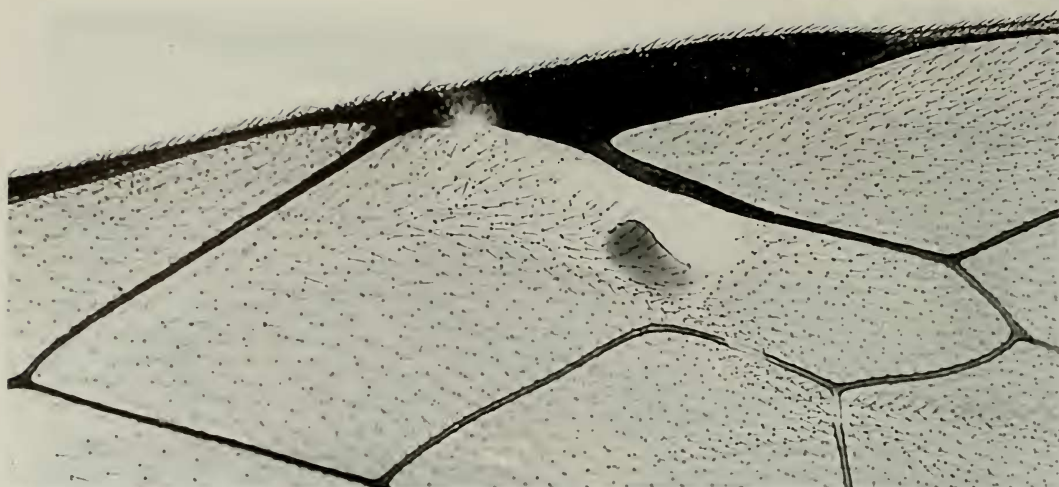


28. *Enicospilus variegatus*



29. *Enicospilus vitreipennis*

Figs 27–29. Fore wing discal cells.



30. *Enicospilus waimeae*

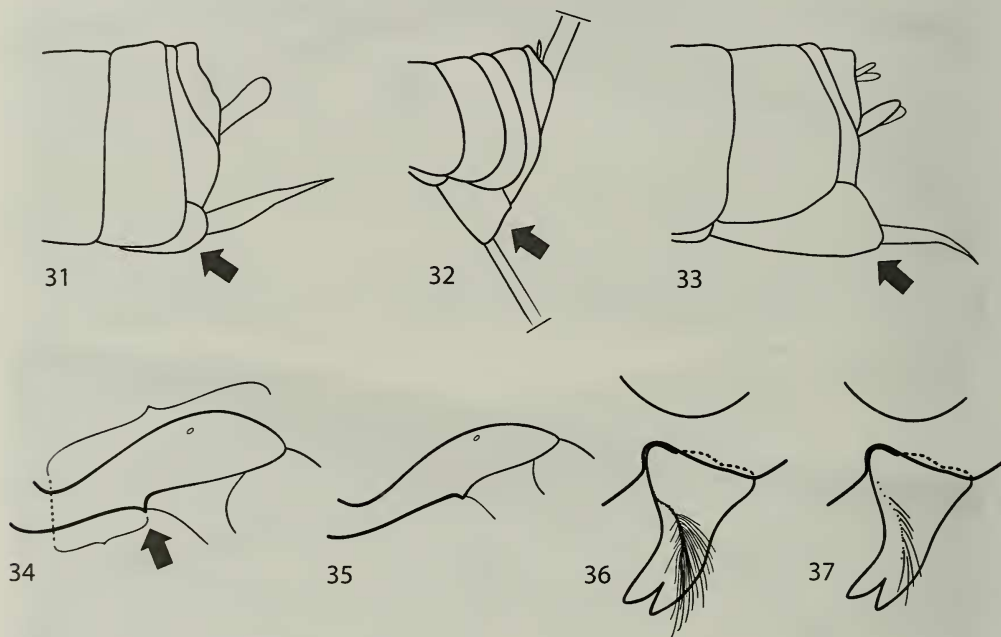


Fig. 30. Fore wing discal cell.

Figs 31-33. metasomal apices, arrows indicate S7.

Fig. 34. *Enicospilus niger* petiole in lateral view, arrow indicates ventral posterior margin, brackets indicate dorsal and ventral lengths.

Fig. 35. *Enicospilus vitreipennis* petiole in lateral view.

Fig. 36. *Enicospilus longicornis* mandible.

Fig. 37. *Enicospilus lineatus* mandible.

Perkins 1915: 525. Townes et al. 1961: 293.
Gupta 1987: 583. Yu and Horstmann 1997:
752.

Henicospilus variegatus (Ashmead); Szépligeti
1905: 27

Enicospilus (*Enicospilus*) *variegatus* Ashmead;
Cushman 1944: 51.

Remarks.—This large species (fore wing
length 14.5–16.0 mm) can be recognized by

its highly contrasting color pattern. It is largely dark brown to black except for the following yellow or yellowish-brown areas: head, pronotum (in total or in part), mesonotum and scutellum in part, upper mesopleuron, metapleuron, anterodorsal part of propodeum, and legs (except for the femora apically, and with the possible exception of the apical tarsomeres). Additionally, the fore wing discosubmarginal cell contains a large, triangular, proximal sclerite and often a second, vestigial sclerite at the apical, posterior fenestral margin (Fig. 28); the wings are more or less hyaline.

Enicospilus vitreipennis (Perkins),
reinstated combination
Figs 29, 35

Banchogastra vitreipennis Perkins 1910: 680. Lectotype (designated by Townes et al. 1961: 293 [Their usage of "type" is herein regarded as equivalent to a lectotype designation (ICZN 1999: Art. 74.5).]) female, Maui, Haleakala, 5000 ft (BPBM) [examined]; transferred to *Enicospilus* by Townes et al. 1961. Gupta 1987: 506. Yu and Horstmann 1997: 730.

Enicospilus vitreipennis (Perkins); Townes et al. 1961: 293.

Remarks.—This small species (fore wing length 7.5–9.5 mm) can be recognized by the combination of its coloration (darkest brown to black throughout with the possible exception of the wings which vary from nearly hyaline to dark brown); short ovipositor; highly reduced compound eye; discosubmarginal cell usually without a trace of a fenestra and densely setose throughout; propodeum coarsely rugose, areolate, or rugostriate with a strong anterior transverse carina; mid coxa without strong dorsomedial ridges; posterior transverse carina of the mesosternum absent; T2 usually longer than wide in dorsal view; and, with respect to *E. niger*, a less compact, flatter petiole that is further described in the key (Fig. 35).

Enicospilus waimeae Ashmead
Fig. 30

Enicospilus waimeae Ashmead 1901: 348. Lectotype (designated by Townes et al. 1961: 293) female, Kauai, Mts Waimea, 4000 ft, VI.1894, Perkins (BMNH); Perkins 1915: 525. Townes et al. 1961: 293. Gupta 1987: 586.

Henicospilus waimae [!] (Ashmead); Szépligeti 1905: 27.

Enicospilus (*Enicospilus*) *waimeae* Ashmead; Cushman 1944: 51.

Remarks.—This rarely collected, moderately large species (fore wing length 11.0–13.4 mm) is principally recognized by its single, extremely large sclerite of the fore wing discosubmarginal cell (Fig. 30). Additionally, it is generally slenderer than *E. lineatus* (to which it otherwise most closely resembles); is more or less brown throughout (becoming lighter brown on the face laterally, gena, tibiae, tarsi, and metasoma apically); has a short, straight ovipositor; and has slightly infumate wings.

ACKNOWLEDGMENTS

I am grateful to a number of persons who have assisted me in various ways with this study. Michael Engel and Charles Michener read an early version of this paper and made helpful suggestions. The late James S. Ashe provided valuable guidance early on. Gavin Broad and an anonymous reviewer provided helpful comments. Personnel at several institutions assisted with specimen loans and information requests including Ian Gauld, Gavin Broad, Stuart Hine, David Wahl, David Furth, Robert Carlson, Robert Kula, Brian Harris, Frank Howarth, Tino Gonsalves, Shepherd Myers, Robert Zuparko, John Huber, James Liebherr, Daniel Rubinoff, and Will Haines. Betsy Gagné and Wayne Souza assisted in acquiring collecting permits. Support was provided by National Science Foundation grant EF-0341724 (M. S. Engel P. I.) and NSF/Kansas EPSCoR grant KAN29503 (M. S. Engel P. I.).

LITERATURE CITED

- Alfken, J. D. 1904. Beitrag zur insectenfauna der Hawaiianischen und Neuseeländischen Inseln. (Ergebnisse einer Reise nach dem Pacific.) Schauinsland 1896–97. *Zoologische Jahrbücher* 19: 561–628.
Anonymous. 1913. Notes and exhibitions. *Proceedings of the Hawaiian Entomological Society* 2: 202–203.

- Anonymous. 1917. Notes and exhibitions. *Proceedings of the Hawaiian Entomological Society* 3: 202–286.
- Anonymous. 1924. Notes and exhibitions. *Proceedings of the Hawaiian Entomological Society* 5: 345.
- Anonymous. 1925. Notes and exhibitions. *Proceedings of the Hawaiian Entomological Society* 6: 10–11.
- Anonymous. 1955. Notes and exhibitions. *Proceedings of the Hawaiian Entomological Society* 15: 385–387.
- Ashmead, W. H. 1900. Classification of the ichneumon-flies, or the superfamily Ichneumonoidea. *Proceedings of the United States National Museum* 23: 1–220.
- Ashmead, W. H. 1901. Hymenoptera Parasitica. Pp. 277–364. in: D. Sharp ed. *Fauna Hawaiiensis*, [Vol. 1, Part 3]. Cambridge University Press, Cambridge, UK.
- Bennett, D. J. 2004. A cladistic analysis of Hawaiian ophionine wasps (Hymenoptera: Ichneumonidae). Master's thesis, University of Kansas, Lawrence; v + 45 pp.
- Blackburn, J. and P. Cameron. 1886. On the Hymenoptera of the Hawaiian Islands. *Proceedings of the Manchester Literary and Philosophical Society* 25: 134–183.
- Blackburn, J. and P. Cameron. 1887. On the Hymenoptera of the Hawaiian Islands. *Memoirs of the Manchester Literary and Philosophical Society* 3 (10) [= third series, tenth volume]: 194–244.
- Cameron, P. 1883. Descriptions of new genera and species of Hymenoptera. *Transactions of the Entomological Society of London* 1883 (2): 187–197.
- Chu, J. T. 1935. Preliminary notes on the Ichneumon-flies in Kiangsu and Chekiang Provinces, China. *Yearbook of the Bureau of Entomology of Chekiang Province* 1934: 7–32.
- Cushman, R. A. 1944. The Hawaiian species of *Enicospilus* and *Abanchogastra* (Hymenoptera: Ichneumonidae). *Proceedings of the Hawaiian Entomological Society* 9 (12): 39–56.
- Cushman, R. A. 1947. A generic revision of the ichneumon-flies of the tribe Ophionini. *Proceedings of the United States National Museum* 96: 417–482.
- Dalla Torre, C. G. 1901. *Catalogus Hymenopterorum*. Volumen III: Trigonalidae, Megalyridae, Stephanidae, Ichneumonidae, Agriotypidae, Evaniidae, Peleciniidae. Guilelmi Engelmann, Lipsiae. [1901: 1–544; 1902: 545–1141].
- Fullaway, D. T. 1957. Checklist of the Hymenoptera of Fiji. *Proceedings of the Hawaiian Entomological Society* 16: 269–290.
- Fullaway, D. T. and W. M. Giffard. 1919. Notes on Collection of Hawaiian Insects on Island of Maui. *Proceedings of the Hawaiian Entomological Society* 4: 50–52.
- Gauld, I. D. 1985. The phylogeny, classification and evolution of parasitic wasps of the subfamily Ophioninae (Ichneumonidae). *Bulletin of the British Museum of Natural History (Entomology)* 51: 61–185.
- Gauld, I. D. 1988. A survey of the Ophioninae (Hymenoptera: Ichneumonidae) of tropical Mesoamerica with special reference to the fauna of Costa Rica. *Bulletin of the British Museum of Natural History (Entomology)* 57: 1–309.
- Gauld, I. D. and P. A. Mitchell. 1981. *The taxonomy, distribution and host preferences of Indo-Papuan parasitic wasps of the subfamily Ophioninae*. Commonwealth Agricultural Bureaux, Slough, UK; 611 pp.
- Gupta, V. K. 1987. The Ichneumonidae of the Indo-Australian area (Hymenoptera). *Memoirs of the American Entomological Institute* 41: 1–597.
- Harris, R. A. 1979. A glossary of surface sculpturing. *Occasional Papers in Entomology*. State of California, Department of Food and Agriculture, Division of Plant Industry-Laboratory Services 28: 1–31.
- Iwata, K. 1950. Biology of Ichneumon parasites on bag-worms in Japan, I. *Transactions of the Kansai Entomological Society*. Osaka 15: 35–47.
- International Commission on Zoological Nomenclature. 1999. *International Code of Zoological Nomenclature*, 4th ed. International Trust for Zoological Nomenclature, London, UK; xxix + 306 pp.
- Lee, J. W. and C. W. Kim. 1980. A taxonomical study on the Korean Ophioninae (Hym., Ichneumonidae). *Korean Journal of Entomology* 10: 9–18.
- Morley, C. 1912. *A revision of the Ichneumonidae* 1. London, UK; vi + 88 pp.
- Perkins, R. C. L. 1902. Four new species and a new genus of parasitic Hymenoptera (Ichneumonidae: Ophioninae) from the Hawaiian Islands. *Transactions of the Entomological Society of London* 1902: 141–143.
- Perkins, R. C. L. 1907a. The Insects of Tantalus. *Proceedings of the Hawaiian Entomological Society* 1: 38–51.
- Perkins, R. C. L. 1907b. Insects at Kilauea, Hawaii. *Proceedings of the Hawaiian Entomological Society* 1: 89–99.
- Perkins, R. C. L. 1910. Supplement to Hymenoptera. Pp. 600–686. in: D. Sharp ed. *Fauna Hawaiiensis* [Vol. 2]. Cambridge University Press, Cambridge, UK.
- Perkins, R. C. L. 1913. Introduction. Pp. xv–ccxxvii. in: D. Sharp ed. *Fauna Hawaiiensis* [Vol. 1, part 6]. Cambridge University Press, Cambridge, UK.
- Perkins, R. C. L. 1915. On Hawaiian Ophioninae (Hymenoptera, Fam. Ichneumonidae). *Transactions of the Entomological Society of London* 1914: 521–535.
- Ruthe, J. F. 1859. Verzeichnis der von Dr. Staudinger im Jahre 1856 auf Island gesammelten Hymenopteren. *Stettiner Entomologische Zeitung* 20: 362–379.

- Swezey, O. H. 1915. A preliminary list of the hymenopterous parasites of Lepidoptera in Hawaii. *Proceedings of the Hawaiian Entomological Society* 3: 99–109.
- Swezey, O. H. 1931. Some observations on the insect faunas of native forest trees in the Olinda forest on Maui. *Proceedings of the Hawaiian Entomological Society* 7: 493–504.
- Swezey, O. H. 1954. Forest entomology in Hawaii. An annotated check-list of the insect faunas of the various components of the Hawaiian forests. *Special Publication of the Bernice P. Bishop Museum* 44: 1–266.
- Swezey, O. H. and E. H. Bryan. 1927. Notes on some forest insects of Molokai. *Proceedings of the Hawaiian Entomological Society* 6: 411–422.
- Swezey, O. H. and F. X. Williams. 1932. Some observations on forest insects at the Nauhi Nursery and vicinity in Hawaii. *Proceedings of the Hawaiian Entomological Society* 8: 179–190.
- Szépligeti, G. V. 1905. Hymenoptera Ichneumonidae. In: Wytsman, P. ed. *Genera Insectorum* 34: 1–68. Bruxelles.
- Szépligeti, G. V. 1906. Neue exotische Ichneumoniden aus der Sammlung des Ungarischen national Museums. *Annales Musei Nationalis Hungarici* 4: 119–156.
- Townes, H. 1945. A catalogue and reclassification of the Nearctic Ichneumonidae (Hymenoptera). Part II. The subfamilies Mesoleiinae, Plectiscinae, Orthocentrinae, Diplazontinae, Metopiinae, Ophioninae, Mesochorinae. *Memoirs of the American Entomological Society* 11: 478–925.
- Townes, H. 1957. A review of the generic names proposed for old world ichneumonids, the types of whose genotypes are in Japan, Formosa, or North America. *Proceedings of the Entomological Society of Washington* 59: 100–120.
- Townes, H. 1969. Genera of Ichneumonidae 1. *Memoirs of the American Entomological Institute* 11: 1–300.
- Townes, H. 1971. Genera of Ichneumonidae 4. *Memoirs of the American Entomological Institute* 17: 1–372.
- Townes, H. and M. Townes. 1973. Ethiopian Ichneumonidae. *Memoirs of the American Entomological Institute* 19: 1–416.
- Townes, H., M. Townes, and V. K. Gupta. 1961. A catalogue and reclassification of the Indo-Australian Ichneumonidae. *Memoirs of the American Entomological Institute* 1: 1–522.
- Uchida, T. 1928. Zweiter Beitrag zur Ichneumoniden-Fauna Japans. *Journal of the Faculty of Agriculture of Hokkaido Imperial University* 21: 177–297.
- Yu, D. S. and K. Horstmann. 1997. A Catalogue of World Ichneumonidae (Hymenoptera). Part 1. Subfamilies Acaenitinae to Ophioninae. *Memoirs of the American Entomological Institute* 58: 1–763.